Coal Age

OCTOBER, 1953

A McGRAW-HILL PUBLICATION — PRICE 50c

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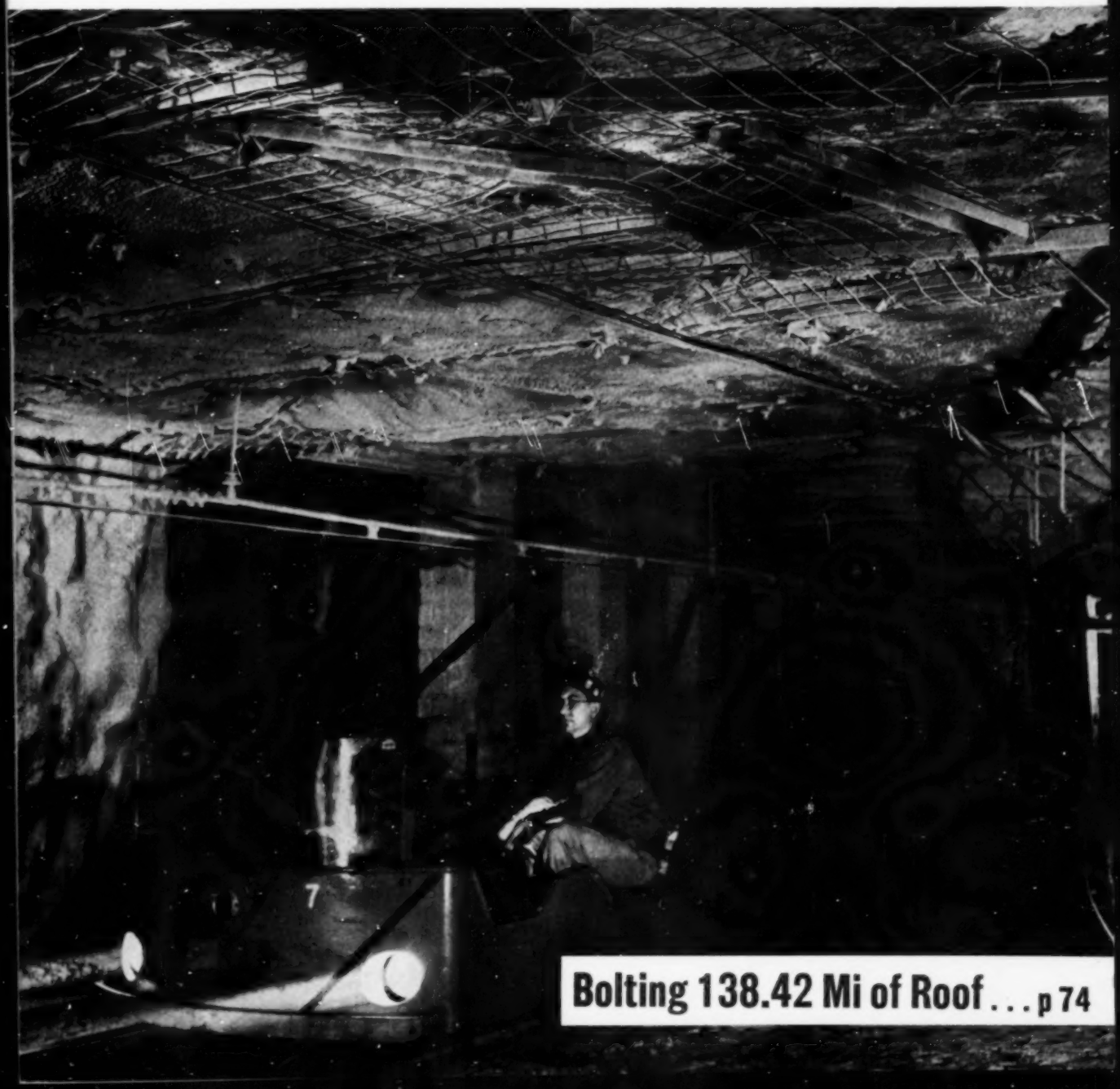
Give the United Way!



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QUICK SWITCH ARTIST!

Adaptable for hauling coal from the mine *and* men or supplies into it, A.C.F. Mine Cars speed production from the face to dumping point. A.C.F.'s exclusive Drop Bottom design further speeds production by permitting the nonstop unloading of coal at the rate of a ton a second.

A.C.F. Mine Cars never stop working. Any damaged car can be quickly switched to a siding where your own men can easily handle necessary repairs.

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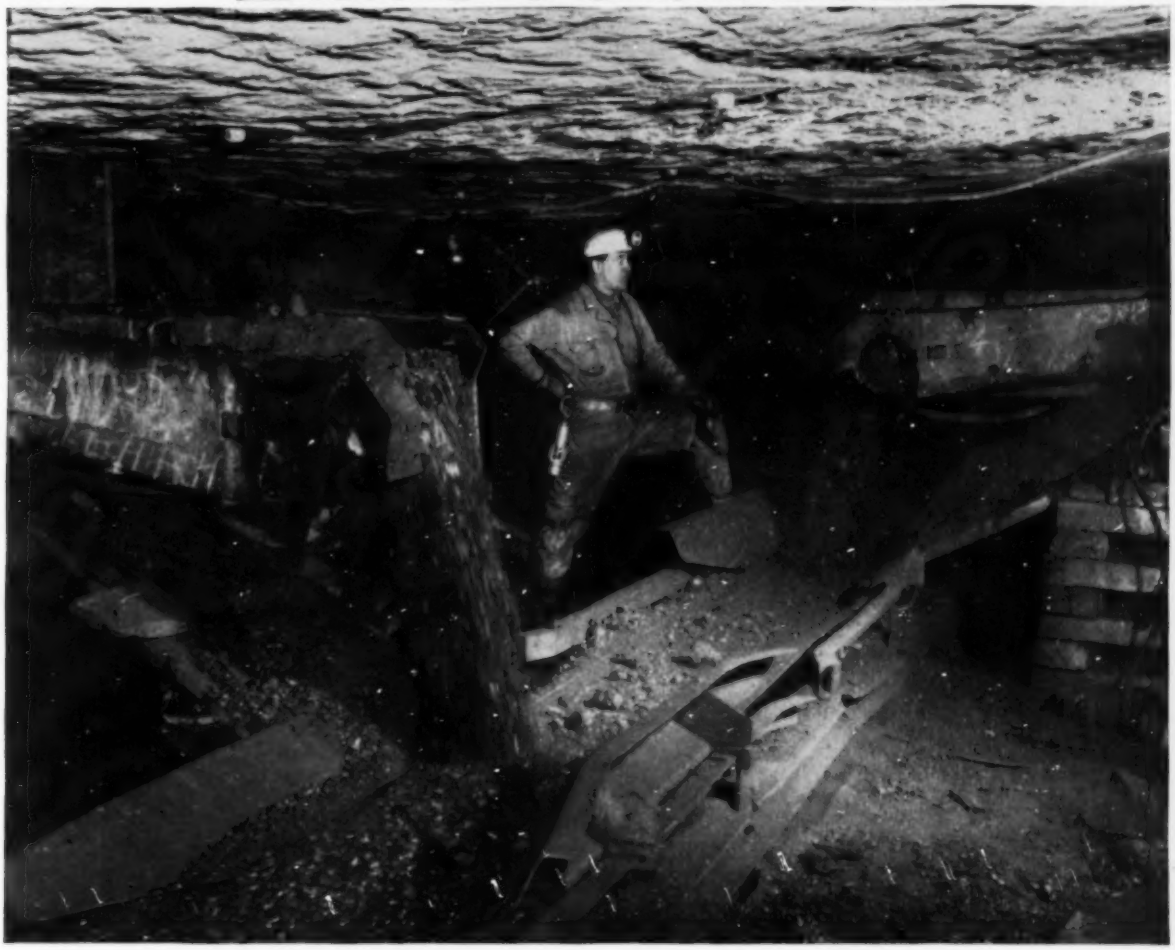
a.c.f. MINE CARS

for Constant Haulage

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



B. F. Goodrich cord belt takes tons of abuse, gives years of use

EVERY DAY hundreds of tons of jagged coal pound down on this belt from a height of 4 feet. Engineers predicted an ordinary belt would wear out in two or three years, so they installed a Caricoal *cord* belt, developed by B. F. Goodrich.

The B. F. Goodrich cord belt has 2 to 6 times the impact resistance of fabric belts because of an extra cushion built into both the top and bottom of the belt. This cushion is a ply of parallel cords running lengthwise. Each cord is completely surrounded by rubber—no cross threads tie them together—so they are free to give as heavy chunks strike the belt, and let the rubber take the shock.

Due to its ability to withstand cutting, gouging and heavy loads, this Caricoal *cord* belt is rounding out its *twelfth* year of service. With a cost-saving service record like this, no wonder all the underground belting in this mine is now BFG cord.

But resistance to impact is just one of the reasons why B. F. Goodrich Caricoal cord belts last longer, serve better. Special inhibitors and cords sealed in rubber provide double protection against mildew. And natural troughing under all conditions helps prevent costly belt damage, excessive "spill". Your nearest BFG distributor can show you how these longer-lasting conveyor belts can cut your coal-handling costs, or send for the free booklet describing the B. F. Goodrich Caricoal line.

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Without cost or obligation, please
☐ send me booklet about B. F. Goodrich conveyor belts.
☐ have a BFG distributor see me.

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Caricoal Conveyor Belts
BY
B.F.Goodrich

HE WALKS IN *FIRE*...

Here is a chap all set to go with Shadrach, Mishag and Abendigo . . . a modern industrial "miracle" of patient research, special skill...and so he walks, with science's aid, the "fiery furnace", unafraid.

THANKS TO SPECIALIZED RESEARCH . . .

. . . *now apply this lesson to* COAL MINE LUBRICATION

Hulburt *Quality* GREASE

If ever you've been "burned up" about the high cost of operating and maintaining coal mining machinery . . . and you traced the cause to improper lubrication . . . the remedy is Hulburt Quality Grease. And remember this—this Lubricant is no "miracle" remedy. It is the product of long years of patient research and special skill, made to meet the "fiery furnace" test of friction under coal mining conditions—made, in short, "to do one thing and do it supremely well". You can stay unafraid of friction when you use Hulburt Quality Grease.

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

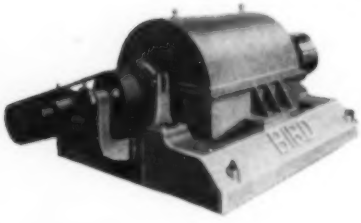
Polish Up Your Coal Cleaning Water

And Save Yourself A Lot Of Trouble And Expense

The Bird Polisher takes out those extra fine, high ash particles after a simple flocculation treatment.

The water is returned to the washer clean – in good shape for recirculation.

The unwanted slimes are delivered to a refuse belt.



Sludge pond and stream pollution troubles are done away with for good and all.

Let us tell you how this practical and proved successful answer to the coal cleaning water problem can be applied to your advantage and profit.

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

Coal Age

OCTOBER • 1953

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Cost Cutting at the Face

WHERE YOU START and how you go about paring per-ton costs of individual face operations keynote the the next article in *Coal Age's* continuing series of Special Reports on "Cost Cutting Today," scheduled for the November issue.

Have you recently taken a searching look at your face methods? Have you carefully analyzed and weighed every phase of your face cycle—drilling, cutting, blasting, conventional loading or continuous mining and intermediate haulage? This article won't hand you the answers ready-made, but it will suggest how you can get those answers with a minimum of trouble, how to put your finger on costly practices that may not be as essential as you think—and what to do once they're spotted.

For example, how can you make sure that your loading machines always have coal, that your continuous miners are being worked to full advantage?

Do you know that you are getting the most effective use possible from the machines you have underground? Is it likely that other companies with similar mining conditions are using different methods you might consider?

Are you interested in what other mines have done to eliminate unnecessary delays—and even the so-called "necessary" delays—from their face cycle?

Are the men under you intelligently seeking new ways to do their jobs, to get more production with less cost—and can you effectively encourage and guide them.

Month after month, articles in *Coal Age* help you answer such questions on various phases of mine operation. In "Cost-Cutting at the Face," practices and experience of many mines have been digested and combined to give you a means of assessing your own work. Look for it in November *Coal Age.*

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VOLUME 58 NUMBER 10
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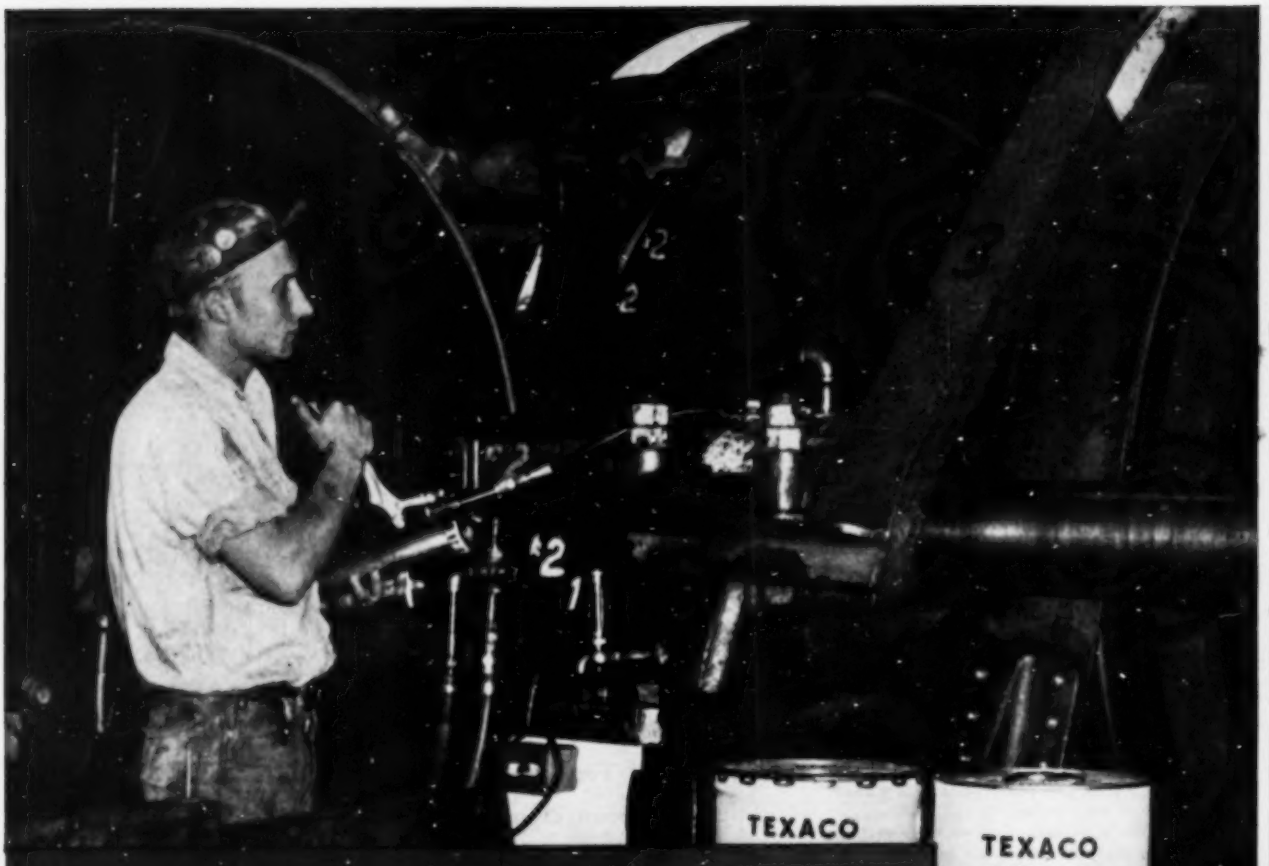
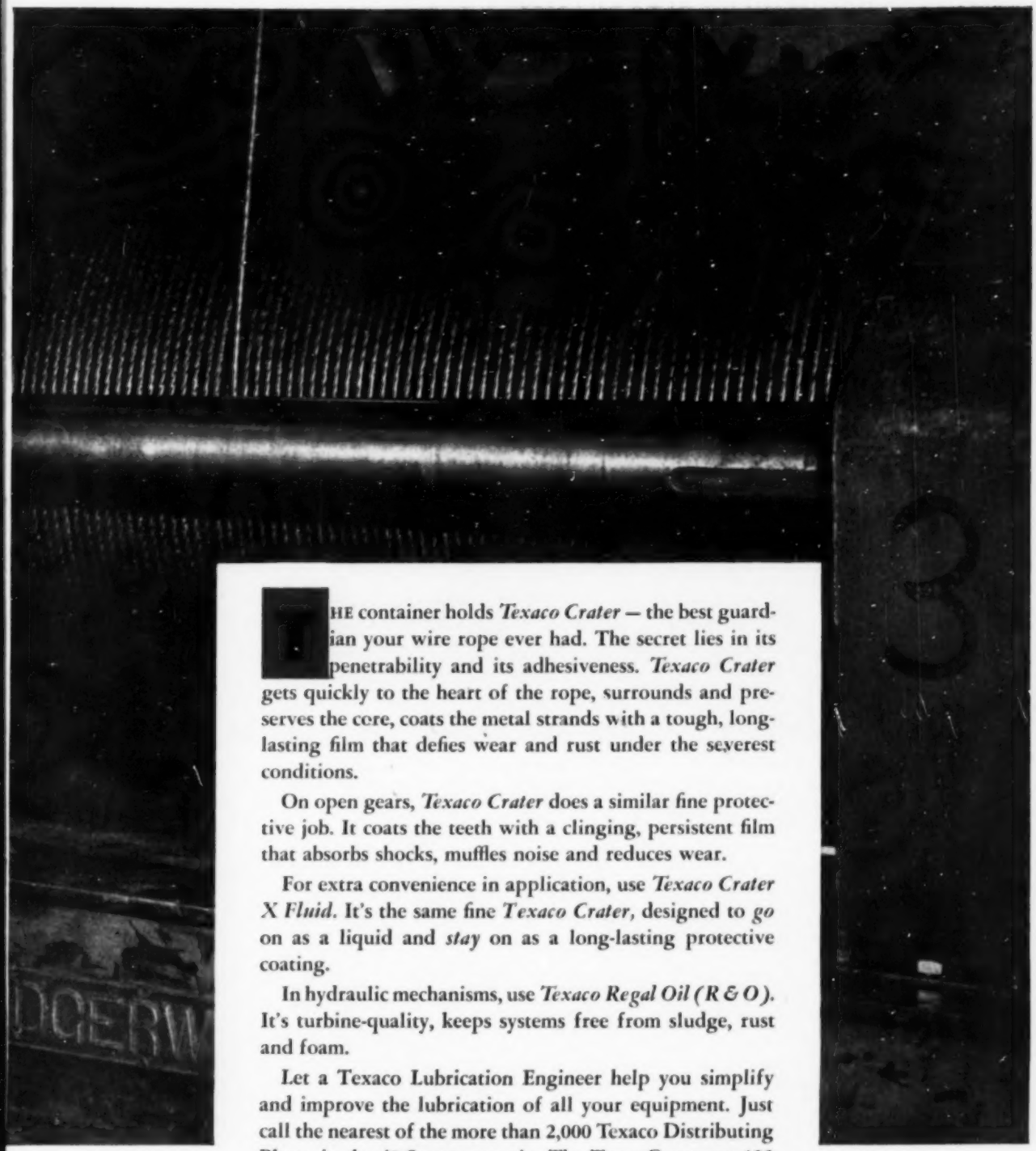


HEREIN . . . .
LIES THE REASON WIRE ROPE LASTS LONGER

TEXACO

TEXACO



THE container holds *Texaco Crater* — the best guardian your wire rope ever had. The secret lies in its penetrability and its adhesiveness. *Texaco Crater* gets quickly to the heart of the rope, surrounds and preserves the core, coats the metal strands with a tough, long-lasting film that defies wear and rust under the severest conditions.

On open gears, *Texaco Crater* does a similar fine protective job. It coats the teeth with a clinging, persistent film that absorbs shocks, muffles noise and reduces wear.

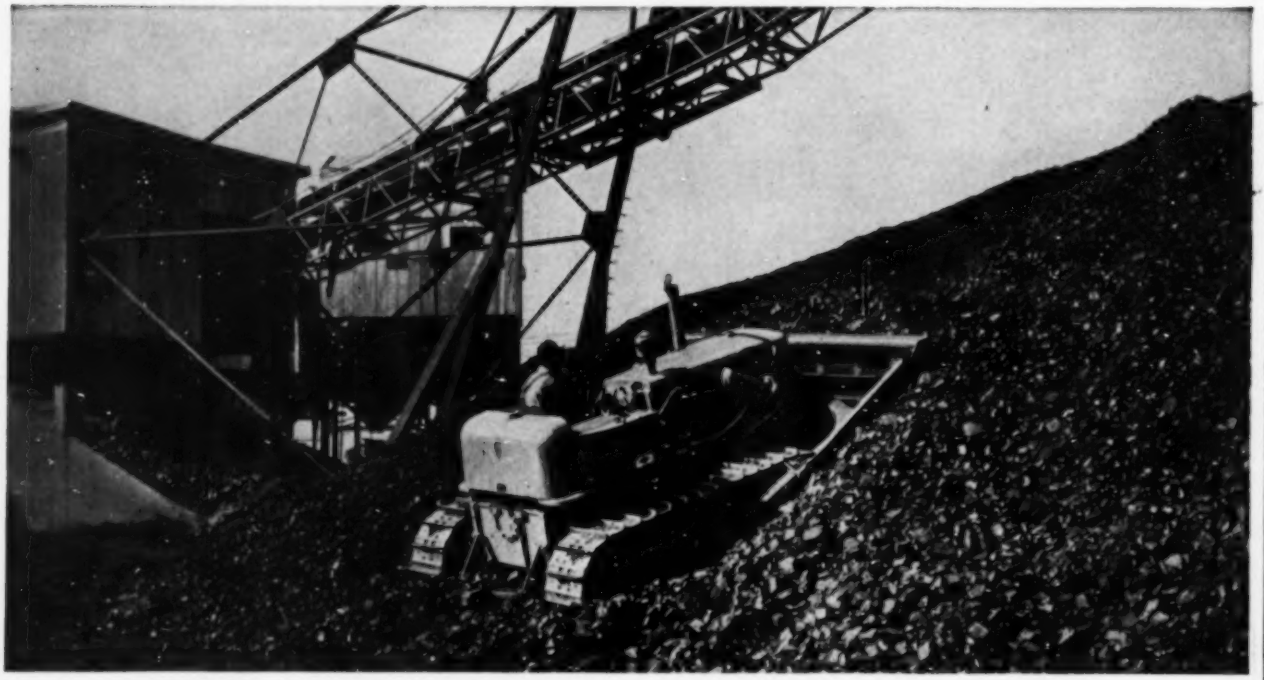
For extra convenience in application, use *Texaco Crater X Fluid*. It's the same fine *Texaco Crater*, designed to *go* on as a liquid and *stay* on as a long-lasting protective coating.

In hydraulic mechanisms, use *Texaco Regal Oil (R & O)*. It's turbine-quality, keeps systems free from sludge, rust and foam.

Let a Texaco Lubrication Engineer help you simplify and improve the lubrication of all your equipment. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICANTS for the Coal Mining Industry

NEW TRENDS IN MINING MECHANIZATION



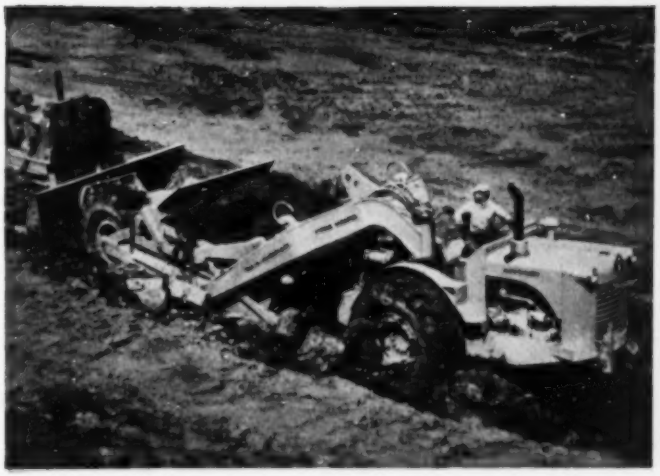
Maintains Coal Stockpiles At Mine. HD-9 Tractor also handles stripping, cuts drainage ditches, feeds and cleans up around shovels, tows equipment. Wide range of bulldozers — straight or angled, cable or hydraulic — assures the right combination for every job. Each is designed to retain tractor balance and accessibility.

Loads Hauling Units. HD-20G Tractor shovel loads coal, overburden, other bulk materials — four cubic yards at a scoop. With 175 net engine horsepower, it has the excavating ability to load coal right out of some seams without blasting.

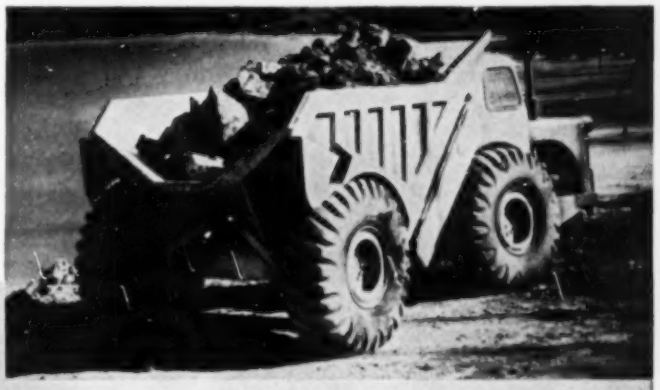
Builds and maintains haul roads. AD-40 Motor Grader levels pit bottoms . . . digs and grades for drainage . . . scarifies . . . prepares dragline sites. Gasoline-powered Model D Grader also available. Handles routine road maintenance — light construction, etc.

TODAY'S demands on mining production require the selection of equipment of the broadest versatility. Allis-Chalmers offers a complete range of material moving and handling equipment — including four sizes of diesel crawler tractors, motor graders, pull scrapers, high-speed Motor Scrapers and Motor Wagons — designed to fit your particular mining applications and to deliver the highest possible output.

Here are some on-the-job views with a few of the many ways in which these modern machines are speeding production and lowering costs.



Strips overburden. 13-yard heaped capacity TS-200 Motor Scraper also loads, hauls material from open pit . . . clears and levels for camp sites and drill setups . . . levels and grades building sites . . . hauls in supplies. Larger 18-yard heaped capacity TS-300 also available.



Hauls rock overburden. TR-200 Motor Wagon body is interchangeable with TS-200 Motor Scraper body. Unit travels fast "off-road" with capacity loads . . . dumps clean every time with 18-ton, hydraulic-controlled rear-dump body. Sides channel-ribbed for rigidity.

Tractor-Scraper Team. HD-20 Tractor with pull-type scraper loads and hauls coal — handles large-scale stripping jobs. Exclusive Allis-Chalmers hydraulic torque converter on HD-20 gives higher output, less upkeep on pulling, pushing and dozing work.

Complete line of pull-type scrapers available, from 2-yard to 18-yard sizes.

Your Allis-Chalmers dealer will be glad to analyze your equipment needs and help you select the right machines for your jobs. See or phone him soon to watch these machines in action.

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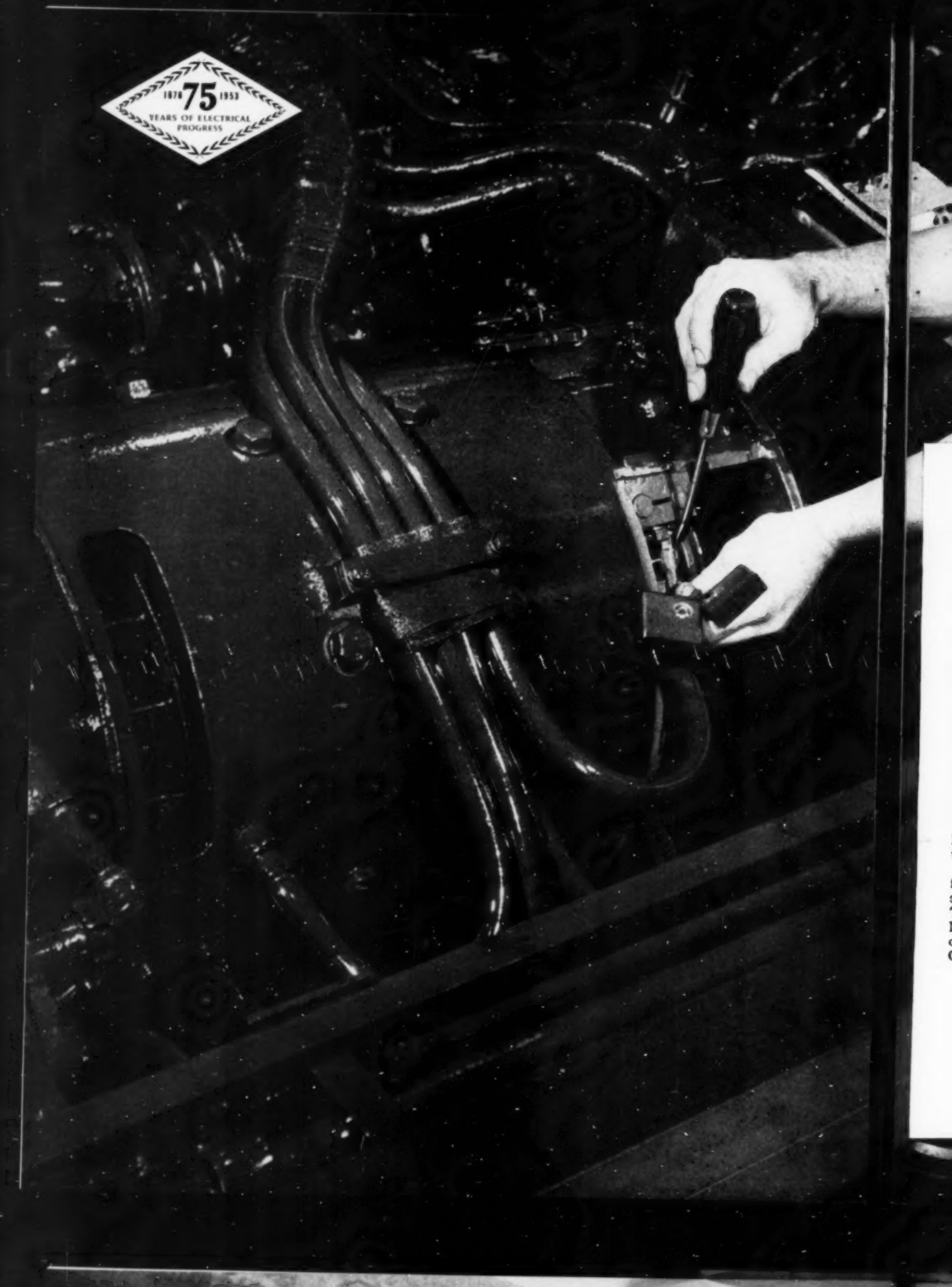
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.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YEARS OF ELECTRICAL PROGRESS

You get long brush life, low commutator wear by always using G-E carbon brush replacements

Getting the most for your maintenance dollar and keeping the electric equipment on your G-E mine locomotives running at top efficiency depends largely on using carbon brushes specifically recommended for the equipment.

That's why it's good maintenance practice to always specify G-E carbon brush replacements for your G-E mine locomotives. They're the result of extensive field experience and a continuing testing program aimed at determining the ideal brush for your locomotives. Their high degree of chip strength and current-carrying capacity, plus a proven ability to absorb shock, enable brushes to give extremely long, satisfactory service. And to keep maintenance costs low, brushes are designed with the proper degree of hardness and grain structure to minimize wear and tear on commutator surfaces.

To get top performance—"original equipment" performance—from your G-E mine locomotives, always specify recommended G-E carbon brush replacements. They're the best you can buy for your G-E mine locomotives. For full pricing and product information, contact your nearest G-E Apparatus Sales office. General Electric Company, Schenectady 5, N. Y.

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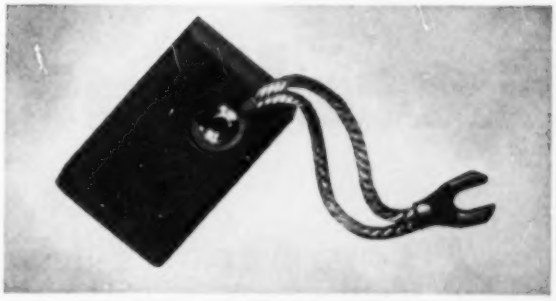


WHY G-E BRUSH REPLACEMENTS ARE IDEAL

G-E brush replacements are ideal—just the right size and grade for long-lasting, economical-brush mileage. Besides having the proper riding qualities required to produce and maintain a good surface film on commutator, they possess sufficient hardness to resist rapid wear and breakage. That's because they're made from high-quality carbon, graphite and other materials which provide the right chip and transverse strength, specific resistance, density and hardness.

You can put your confidence in—

GENERAL ELECTRIC

"Excellent" says J. Robert

7 Tournapulls help strip 7,500,000 tons overburden

Contract stripping over 7,500,000 yards of overburden near Mt. Carmel, Pa., to uncover anthracite deposits, J. Robert Bazley, Pottsville, brought in 7 electric-control Tournapulls. Of these high-speed units, 5 were 14-yd. C Tournapulls . . . the other 2 were new 27½-yd. "A's".

Big "A's" complete 5000′ cycle every 8¾ minutes

Loading tough hardpan, the "A's" got heaped loads of the high-void clay and rock in about a minute. The day pictures were taken, a quick freeze had left the area cut up with frozen ruts and ridges, which slowed both haul and return. Yet, each of the "A's" regularly made a 5000′ cycle every 8¾ minutes, completed 48 trips per 7-hour shift. Working 2 shifts per day, 5 days per week, combined production for the 2 big units has been 233 pay yds. per hour, according to contractor's records. "This LeTourneau-Westinghouse equipment is satisfactory," says Owner J. Robert Bazley. "It has done an excellent job."

General Superintendent Harry H. Hughes declares, "Our LeTourneau rigs have given satisfactory service on this and other jobs."

Prime-movers also operate rear-dumps

In addition to scraper work, the Bazley organization uses its electric-control LeTourneau-Westinghouse prime-movers with rear-dump Tournarocker trailing units on rock work. These extra rear-dump bodies cost only about 25% of the cost of original unit, and are readily interchangeable with the scrapers. Prime-movers thus do *double duty* . . . working steadily month after month where needed most. As James R. Bazley, company Vice President, puts it, "Interchangeability of Scrapers and 'Rockers permits us to use our Tournapull prime-movers the year

Stripping in pit began in April 1947, is expected to continue through 1955.

Tournapull returns to stripping pit down 8% grade. Top speed for 27½-yd. rig is 36.5 mph. Average speed on this 5000' cycle was 12 mph. Same "A" prime-mover interchanges on a 35 or 50-ton Rear-Dump or Bottom-Dump. "C" prime-mover powers 19-ton Scraper, Rear-Dump, and Bottom-Dump.

Pushed by a 167 hp tractor, big 27½-yd. A Tournapull picks up heaped load of tough hardpan, in spite of 38% voids in rocky material. In background, second Tournapull turns 90° to move into loading position.

Bazley

around. By switching the trailing units, we adapt our equipment to the prevailing conditions for the most economical stripping."

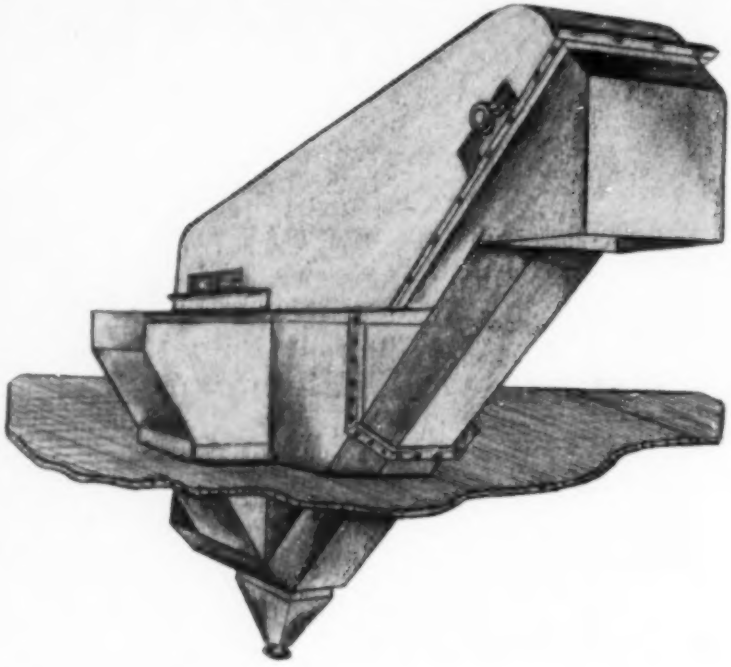
Get facts for your work

Whenever you have dirt, shovel-rock, sand, coal, or other bulk materials to move, it will pay you to check the fast, low-cost work-capacity of LeTourneau-Westinghouse equipment. Ask your Distributor for all the facts. Have him arrange a demonstration on your job. There's no obligation.

Tournapull, Tournarocker—Trademark Reg. U. S. Pat. Off. PAP-381-CM

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS



The DANIELS D M S
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an exclusive product of
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Good News for Coal Producers

The simplest, most accurate and most economical system of Dense-Media Coal Preparation is "Back Home" with its originators. H. J. Daniels & Co., Inc., has transferred the expanded production of D M S Dense-Media coal preparation equipment to its own shops, where proper facilities and long experience assure coal producers Competent Service and ENGINEERED installations.

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Correspondence is invited, particularly, from executives who are conscious of the desirability of Dense-Media Separation but have been concerned about installation costs. We specialize in the development of D M S systems to meet existing conditions and requirements at lowest possible cost for both installation and operation.

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Sales Representatives in principal cities throughout the mining world.

White insulation makes iron wire easier to see when charging bore holes.

FOR ECONOMY AND EFFICIENCY

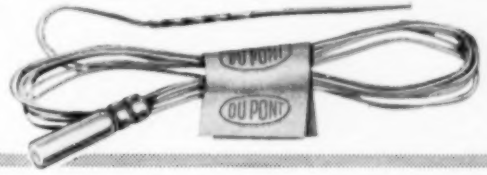
use Du Pont Iron Wire Electric Blasting Caps

Today, hundreds of coal mine operators are using Du Pont Electric Blasting Caps supplied with iron wires, because they are more economical than copper wire caps.

The iron wires have brilliant white plastic insulation that is easy to see in coal. Iron wires also permit easy removal from broken coal with magnetic separators.

Iron wire caps are available with standard-length wires of 4, 6, 7, 8, 9, 10, 12, 16 and 20 feet. For maximum safety, the caps have plastic insulation, rubber plugs and shielded shunts.

Why not consider using economical, efficient Du Pont Iron Wire Caps in your own blasting operations? For complete information about these caps and other blasting supplies and accessories, contact the Du Pont Explosives representative in your district, or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.



DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

9% MORE OUTPUT

By saving 15 to 25 seconds every time it dumps, Koehring heavy-duty Dumptor earns an important increase in yards hauled per hour. For example: At 16 trips an hour on a typical 1000-foot one way haul, saving an average of 20 seconds every cycle gives you 5.3 minutes more productive haul-time . . . and adds 9% to hourly yardage output.

There is no waiting for slow-acting body hoists. With Koehring gravity dump it takes just one second to dump a full 6-yard load. Operator trips the body release lever, and gravity instantly tilts the scoop-shaped body 70° . . . one second later the body is empty, and Dumptor is on its way back for another load.

You get this same one-second dumping even in sub-zero weather because gravity dump never balks . . . never wears out. And you don't lose time or spend money on expensive hoist maintenance or costly replacement parts because Koehring Dumptors have no body hoists.

One-second gravity dump and no body hoist maintenance are typical of Koehring Dumptor's basic principle . . . to reduce all non-productive time and costs to the absolute minimum . . . and to increase work-time for more yards per hour, more profit per yard for you.

Dumptor has many other cost-cutting advantages worth checking . . . it will pay you to get all the details from your Koehring distributor, or write to us for 28-page Dumptor catalog.

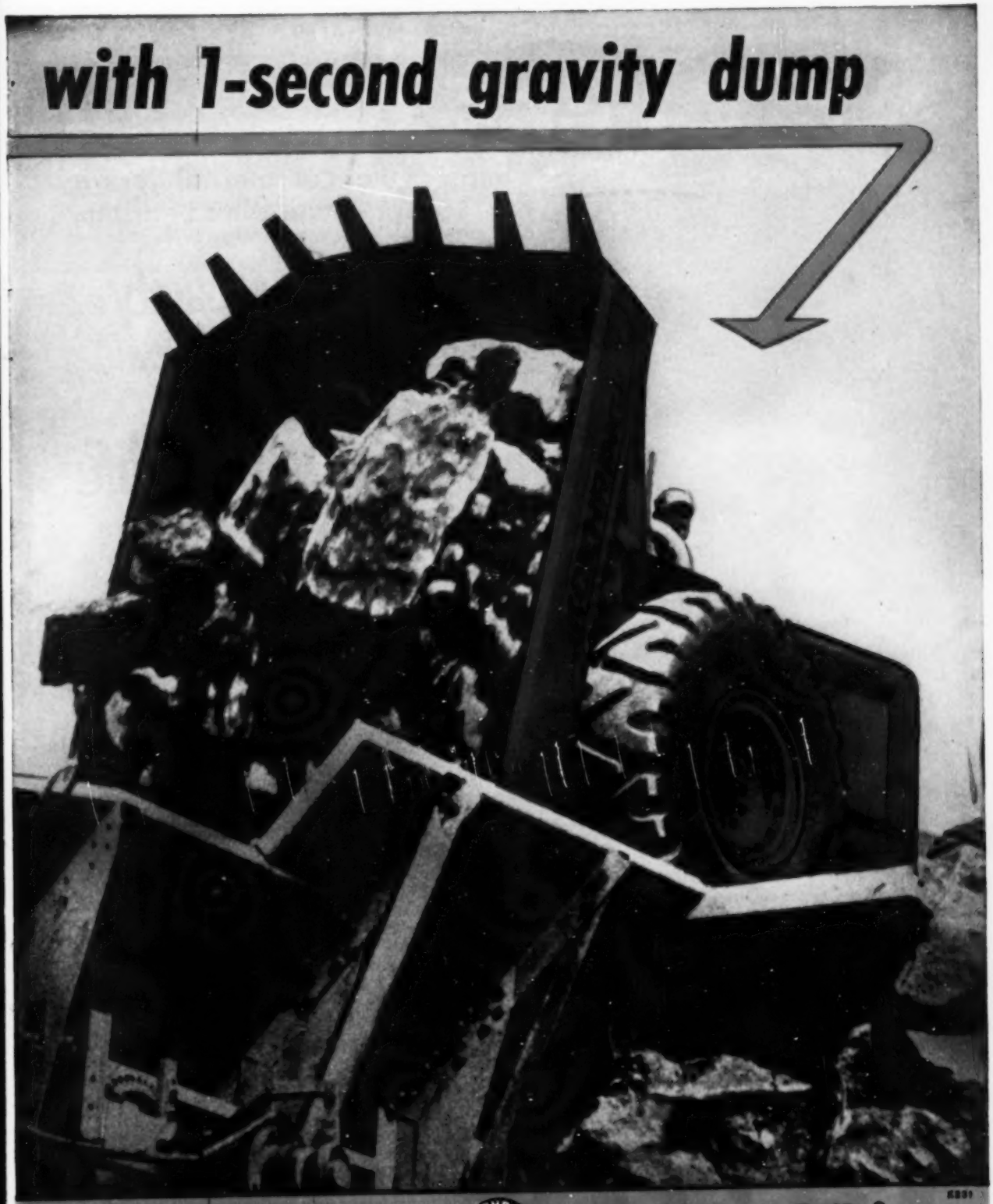
KOEHRING COMPANY • Milwaukee 16, Wis.

Subsidiaries: KWIK-MIX • PARSONS • JOHNSON

FAST CLEANING scoop-shaped body has all-welded sides, ends and bottom heavily reinforced with 4" channel ribs for toughest rock service. Triple strength is built into steel-oak-steel bottom . . . free-swinging kick-out pan adds another steel layer.

NO-TURN SHUTTLE HAUL is another production-boosting Dumptor advantage. Heavy-duty constant-mesh transmission gives the same 3 fast speeds forward and reverse . . . saves turning at the loading unit, on the haul, at the dump . . . speeds cycles.

with 1-second gravity dump



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KOEHRING DUMPTOR®

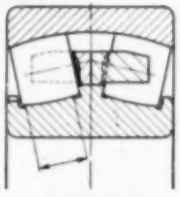
EXCAVATORS . . . ½ TO 2½ YARDS

CRANES . . . 7½ TO 79½ TONS LIFT CAPACITIES

the SKF improvement of internal design of spherical roller bearings

Increases capacity 25% to 50%

increases service life 2 to 3½ times

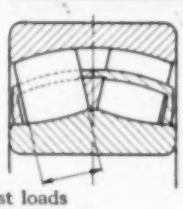


This is the Spherical Roller Bearing design originated by SKF *more than 30 years ago.* The cross-section shows how the integral inner ring flanges, and the undercuts adjacent thereto, limit the effective length of the rollers.

Now, SKF, originator of the Spherical Roller Bearing, has again provided industry with another anti-friction *first.*

This time, it's a revolutionary design advance in Series 222 and 223 bearings providing these advantages:

When designing new equipment, you can obtain the desired life by using smaller or lighter bearings at considerable cost saving. In addition, this forward step in design will carry heavier combinations of radial and thrust loads, or pure thrust loads of greater magnitude. The important self-aligning feature of SKF Spherical Roller Bearings has been preserved, so that considerable misalignment between the shaft and housing has no ill effect whatever on bearing capacity or life.



Here is the latest SKF improvement, *a revolutionary advance in design.* Effective roller guiding is accomplished by means of a separate ring. The need for undercuts is eliminated! This type of guide ring permits the rollers to take the position which their contact with the rings dictates. This assures uniform load distribution over the entire length of the longer rollers at all times. *Result*—greatly increased capacity and life.

During more than 4 years, thousands of installations have been made in railroad journals, vibrating screens, steel mill machinery and numerous other fields. In all cases performance has been outstanding.

SKF Sales Engineers in our District Offices throughout the country will assist you in making use of the important advantages of the improved internal design of SKF Spherical Roller Bearings. **SKF INDUSTRIES, INC.,** Dept. 616, PHILADELPHIA 32, PA.
— *manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*

7424

SKF®
BALL AND ROLLER BEARINGS

This 12-page booklet gives you additional facts—sizes available—added capacity, size by size—increased life you can expect for each size—dimensional tabulations—and load and speed data. Write now for your free copy of Booklet No. 365-2.

© 1953, SKF INDUSTRIES, INC.,

Goodman MOBILE LOADERS AND SHUTTLE CARS

Goodman swing-motion loaders have matchless advantages in any condition of mining:

- Loading head swings to either side for wide path loading—effects good cleanup in corners, along rib and around posting
- Discharge swing allows quick and easy positioning over shuttle car or conveyor
- Combined swing of loading head and discharge end assures maximum recovery when pulling pillars—permits driving crosscuts at 90° angles in narrow work, without double handling of coal

Tramming heights: 26½", 33", 36½" and 41½"

20482

This Unbeatable Combination Underground Puts Record Tonnages On Top

20651

Goodman shuttle cars are noted for:

- adequate capacity to receive surge loads
- speed to effect quick-trip transfer of loads
- maneuvering ability to accelerate productive work
- performance that promotes continuous, uninterrupted service

Basic heights—29", 36", 42", 48"; 4-wheel drive; 4-wheel steer; fixed and elevating discharge

It will pay you to investigate this working combination that delivers profitable performance between face and haulage system. See your Goodman salesman.

Goodman MANUFACTURING COMPANY
4834 S. Halsted Street • Chicago 9, Illinois

Cutting Machines · Conveyors · Loaders · Shuttle Cars · Locomotives · Continuous Miners

"...has hugged the idlers perfectly, right from the start of operations"

says Supt. of Freeman Mine No. 4 about U. S. Ustex-Nylon Slope Belt

Photo shows U. S. Ustex-Nylon Slope Belt. Notice excellent troughability with perfect alignment.

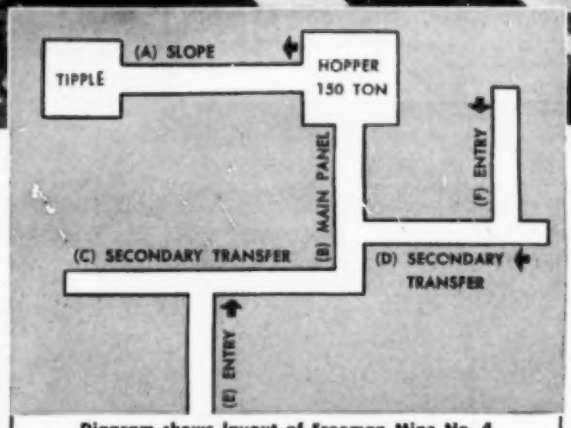


Diagram shows layout of Freeman Mine No. 4

(A) Slope Belt—42" x 6-ply U. S. GIANT® style CX-Ustex-Nylon.

(B) Main Panel Belt—42" 5-ply U. S. GIANT Style XN Ustex.

(C&D) Secondary Transfer Belts—36" 4-ply U. S. GIANT Style XN.

(E&F) Entry Belts—same construction as (C&D).

Look at the facts: A 42" belt, 1,330 feet center to center.

Capacity: 400 tons per hour. Lift: 360 feet. Speed: 300 feet per minute.

"Idler-hugging" troughability, perfect alignment and training result from the quality "U. S." builds into its conveyor belts.

In this highly mechanized, up-to-date mine, not only the slope belt but the gathering belts and the main haulage belt are all made by United States Rubber Company. The mine operator reports their performance is excellent in every way.

The belts supplied this mine are made of Ustex-Nylon and Cotton-Nylon, the two "U. S." patented developments which provide greater strength and flexibility. For steady, day-in and day-out dependability in conveyor belting, it will pay you to investigate the advantages of "U. S." Three-Way Engineering, in which "U. S." engineers work as a team with the mine engineers and the conveyor system engineers. Write to any of our 25 District Sales Offices, or write to address below.

"U.S." Production builds it
"U.S." Research perfects it
U.S. Industry depends on it

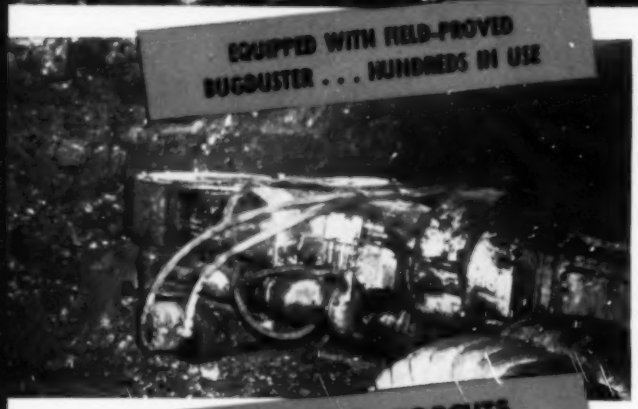
U.S. RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

Here's your Cost-Saving Cutter for Medium-Low Coal!



The 11-RU UNIVERSAL

does EVERYTHING... and does it BETTER!

Only 31" high for trackless operation in medium low coal, the Joy 11-RU Universal Cutter has the extreme flexibility, speed and maneuverability that keeps your cutting costs in check . . . plus the ruggedness that means day-after-day dependability and low maintenance. Available with the famous Joy Bugduster, if desired . . . and when a Joy Cutter is equipped with Sulmet Bits, you have a combination that has given best results and lowest bit cost per ton in every mining field.

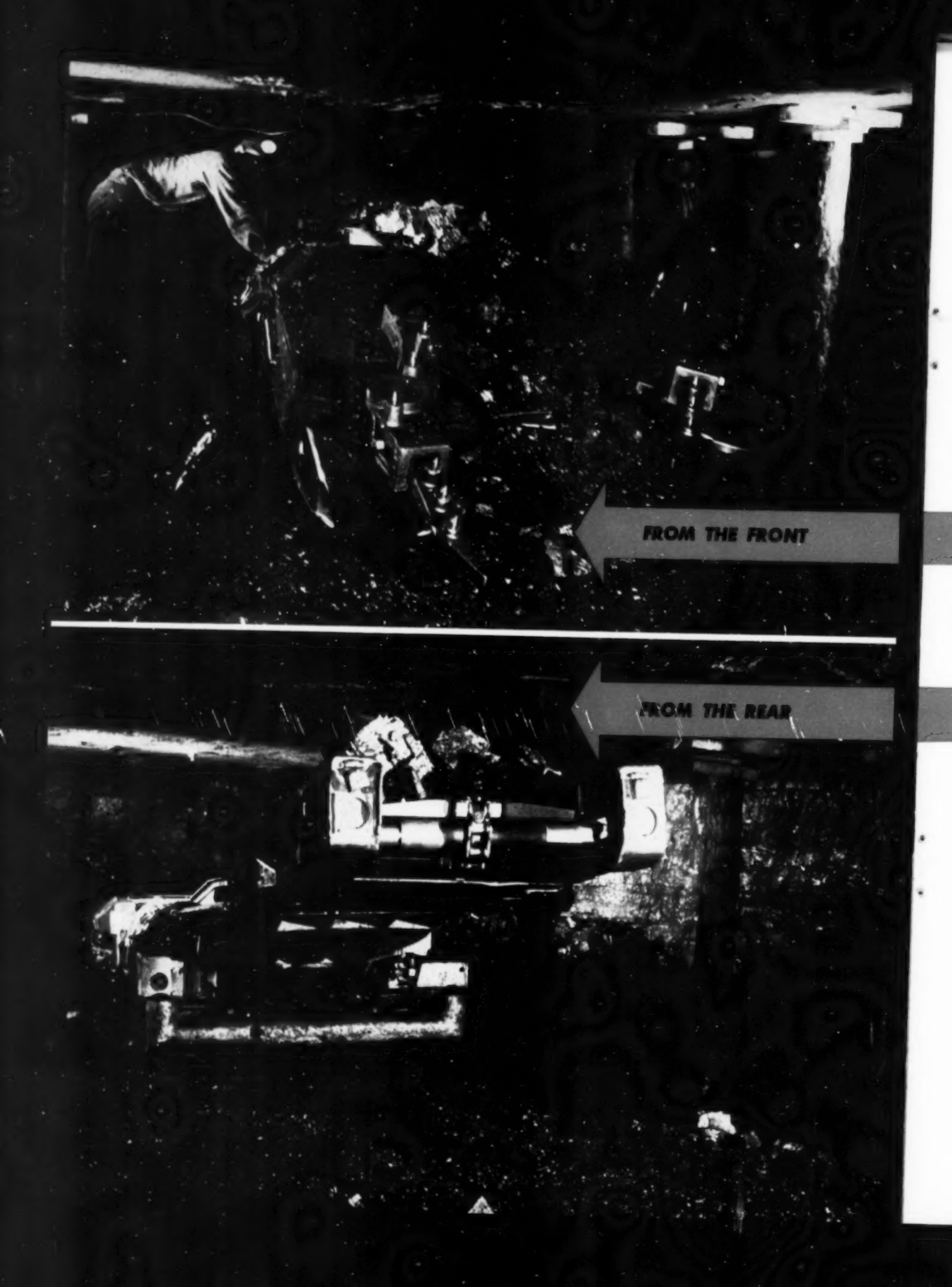
Joy makes a complete line of coal cutters for every mining system, and a range of tungsten carbide bits to meet every seam condition. ● Let us work with you. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada, *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

CL 4579


FROM THE FRONT
FROM THE REAR

THE *SUPER* 14-BU LOADER

No matter how you

look at it, or what comparisons

you make—here's the truly *SUPER* loader for medium-low coal

If you'll keep in mind that the Joy 14-BU has long been the world's most widely used loader . . . and that more coal is loaded by 14-EU's in medium-vein mining than by all other loaders combined—then you'll have a clearer picture of the improvements that Joy engineers have built into this year's *SUPER* 14-BU Loader.

Starting with the simplicity of design and unmatched durability that made the 14-BU so popular, the *SUPER* 14-BU is bigger, faster and more powerful than ever. Here are some of its principal advantages:

1. *Horsepower—increased from 40 to 65 HP.*
2. *Peak Loading Capacity—20% greater.*
3. *High Tramming Speed—increased from 88 to 125 FPM.*
4. *Mechanical and Electrical Components—all increased in size and strength to match the increased motor HP.*
5. *Machine Weight—about 900 lbs. more.*
6. *Heights—unchanged at 30½", 33" and 36", just what the doctor ordered for mining in seams from, say, 36" to 60" thick.*
7. *Conveyor Chain Speed—increased about 30% to more than 300 FPM. Stronger Conveyor Chain, too—with 45% greater tensile strength.*
8. *Maintenance Costs—reduced by providing oversize horsepower motor, wiring and electrical contactors, etc.*

Add extra advantages like those to Joy's famous gathering mechanism and exclusive Magnetax control—features that have been field-proved in every coal mining area in the world—and you have the kind of easy-operating, heavy duty, high production loader that means increased tonnage and reduced costs for you.

● Let us show you what *SUPER* 14-BU Loaders or other Joy Mechanized Equipment can do to improve your profit margin! **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

The 6-SC SHUTTLE CAR

can cut your haulage costs

Can't beat it for speed and flexibility in medium-low coal

In its field, this newest-model Joy 6-SC Shuttle Car is the best assurance of low-cost, high-capacity haulage you can get—and here's why.

First, it's field-proved as the fastest and most dependable car in its class. The 6-SC makes time where it counts . . . in continuous operation from the face to the discharge point and back again.

Second, this year's model includes many improvements, modifications and additions that greatly increase its serviceability and all-around efficiency. Motors, gearing, wheel units, brakes and frame are all overcapacity, and it has interchangeable wheels and nonslip drive, plus such Joy-pioneered features as power steering and airplane-type disc brakes.

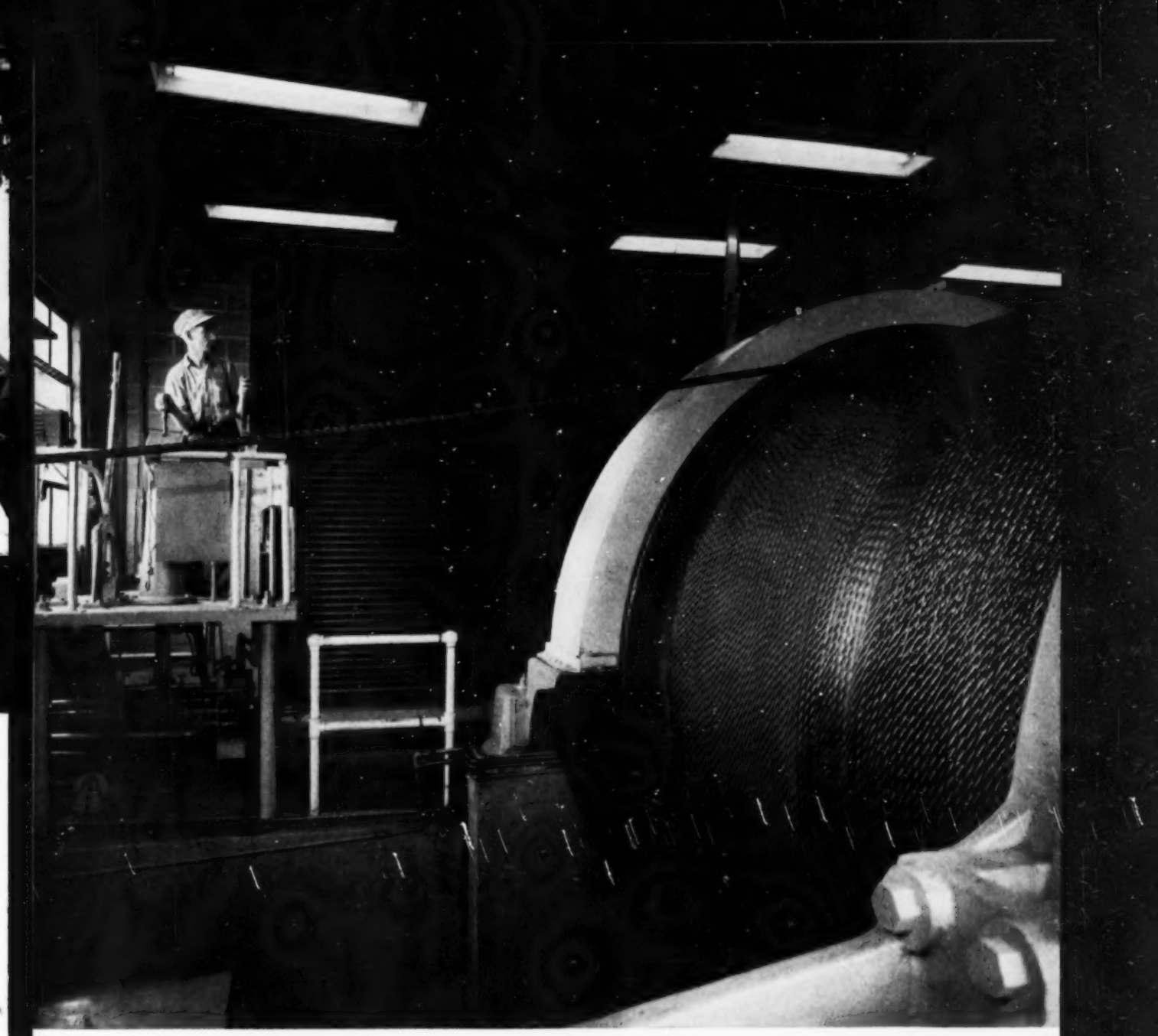
The Joy 6-SC has 4-wheel positive drive, 4-wheel hydraulic steering, and hydraulically adjustable elevating discharge. It is built in five heights from 29" to 38½" without sideboards, with a capacity range from 100 to 180 cu. ft.

● Other Joy Shuttle Cars include a type for every mining condition. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT



Wire Rope at Work—Here's beautiful wire rope in the beautifully-kept hoist house of an Eastern bituminous mine. It's a slope rope, and it's busy all day long sending mine cars, machinery, and other loads down a 16-degree grade—or pulling loads up the same slope from the underground workings. Trips loaded to 18 tons are handled at 800 ft per min.

The hoist rope, 2100 ft long, is 1¼-in. Bethlehem Purple Strand, 6 x 19 Seale with regular lay and fiber core. Perfectly spooled, it is wound on a 10-ft drum powered by a 300-hp AC induction motor. On this operation, as on many others around the same mine, Bethlehem rope is doing a sound, reliable job—the kind it always does in any hauling or lifting work, no matter how tough.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING

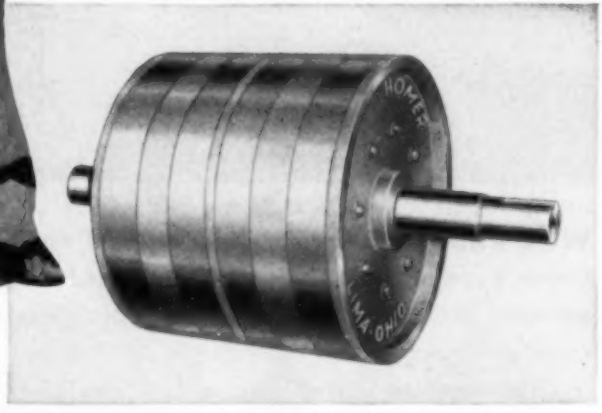
We're Interested...

in your Tramp iron problems!

Yes—we're interested in helping you cut costs, improve your production and your finished products. We're interested in helping you eliminate down-time and damaged equipment—in short, *we're interested in helping you get rid of your TRAMP IRON troubles!*

Regardless of how tramp iron affects your operations, it will pay you well to check production losses and maintenance costs which can be attributed directly to this source of trouble.

Homer maintains complete facilities for investigation and research into your magnetic separation problems. Homer maintains an efficient, nation wide staff of sales representatives, trained in magnetic protection procedure. We invite you to make use of our services. Competent recommendations made without obligation to you. The Homer Manufacturing Company, Inc., Dept. 59, Lima, Ohio.



Remember...

with a HOMER...you are *Certain!*

HOMER

The HOMER non-electric magnetic pulley shown above is one of the largest permanent magnet pulleys ever built. It is 42″ in diameter, with a belt width of 36″. This Homer pulley is installed in a 200 foot long slope conveyor, handling Bauxite Ore up to 600 tons per hour, with a maximum belt speed of 300 feet per minute. Burden varies and at times runs to a depth of 8 inches.

RAYON Makes Coal-Flo Conveyor Belting 8 Ways Better

HERE are 8 reasons why a rayon-bodied Coal-Flo conveyor belt, quality-proved by 10 years of field tests, is your best buy:

1 Balanced Construction—all plies of same, special woven rayon duck having balanced cross-directional strength. Assures proper ply relationship and uniform load distribution.

2 Better Troughability—superior to that of other duck belts of 25% less strength. Results in less belt wander and less edge wear.

3 Greater Fastener Holding Strength—20%-60% greater than belts of similar troughability. Means fewer failures and less maintenance.

4 Low Stretch—up to 50% less than other belts. Reduces need for long costly take-ups often impossible in limited space.

5 Long Flex Life—carcass is 30% thinner than with other duck belts of same strength. Bending is easier—flex resistance greater.

6 Light Weight—rayon weighs 35% less than ordinary fabrics of equal strength. Permits higher pay load. Makes belt easier to handle.

7 High Tear Resistance—strong transverse threads resist lengthwise tears better than heavier, stiffer ducks. Cuts down on repairs.

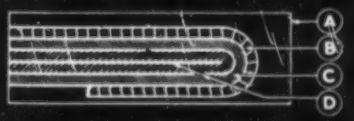
8 Mildew Resistance—exclusive inhibitor, thoroughly proved in 25 years of field use, protects belt against mildew-caused rot.

For more reasons why you should buy Coal-Flo, see your G.T.M.—Goodyear Technical Man.

GOODYEAR INDUSTRIAL PRODUCTS

GTM-Specified

Rayon Coal-Flo Conveyor Belts



A Tough, thick cover of acid-resistant rubber

B Sturdy horseshoe breaker protects ply edges from fraying and wicking moisture

C Plies of superstrong rayon fabric

D Rubber skim-coat between plies increases flex life

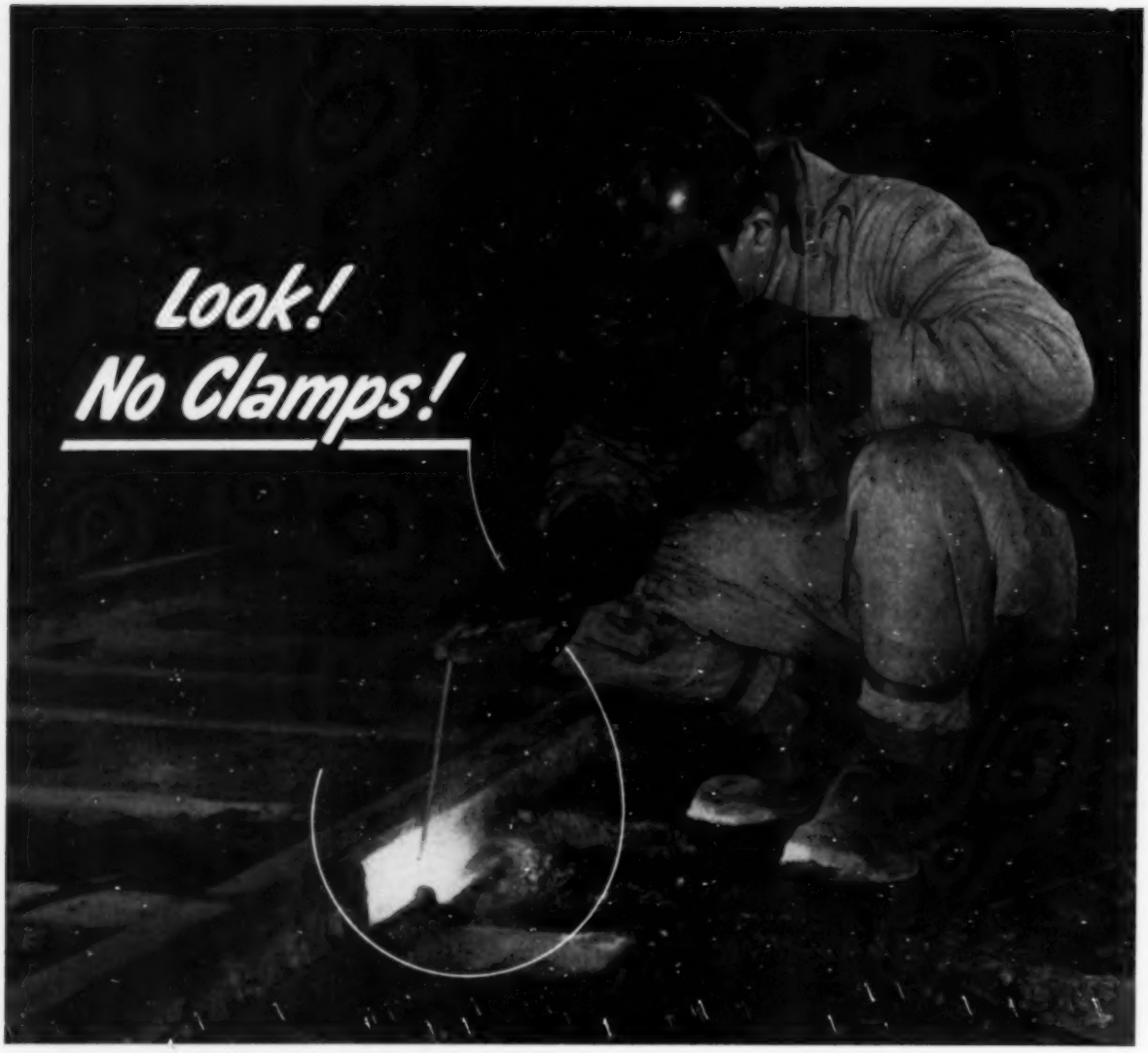
YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose (air, water, steam, oil, special), Belting (V-Belts, transmission, conveyor, elevator), and other industrial rubber products. Look for him in the Yellow Pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

Coal-Flo—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network



with a TIGERWELD BF-10 RAIL BOND

● Self-clamping terminals hold this rugged Tigerweld BF-10 rail bond in place while you weld. You don't waste time installing clamps . . . don't have to worry about the terminals slipping off the track.

Just hammer the terminals on the track. Then make your weld—it is an exceptionally strong steel-to-steel weld that assures a permanent connection.

BF-10's can be reclaimed and used over and over again. They have great fatigue strength. What's more they are reversible.

Write for complete information about this tough, long-lasting Tigerweld BF-10 rail bond.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S American Tigerweld Rail Bonds

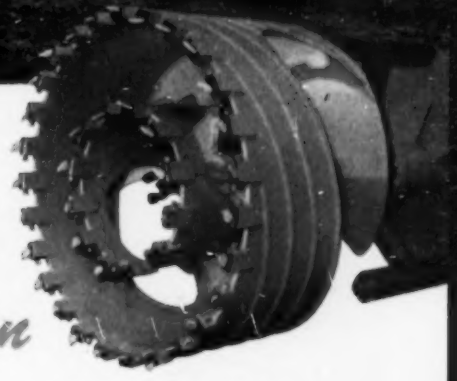
USS

UNITED STATES STEEL

COMPTON Model 48 Coal Auger

Recovers coal up to 208 ft. from the pit wall

. . . regardless of overburden



The Compton Model 48 Coal Auger is designed to give you maximum efficiency at low cost. CHECK THESE FEATURES!

1.—Auger sections racked on frame—ready for transfer to operating position by hydraulically controlled synchronized winches in a matter of seconds.

2.—Hydraulically-operated pilot pan eliminates spillage between machine and high wall.

3.—Entire unit is self-contained including elevating conveyor.

4.—Hydraulically-controlled swivelling discharge turret chute permits uniform trimming of trucks.

5.—Hydraulic jack legs (with self-leveling pontoons for better floatation) permit drilling up to 208 feet without misalignment . . . also permits drilling vertical overlapping holes for varying seam thickness.

COMPTON CUTTING HEAD

EXCLUSIVE WITH COMPTON AUGERS . . . BUILT-IN SPIDER ASSEMBLY ON NON-CLOGGING HEAD RESULTS IN INCREASED PRODUCTION BY DRILLING STRAIGHTER HOLES WITH LESS FRICTIONAL DRAG.

MODEL 48 SPECIFICATIONS

Length: 48 feet; Weight: Approx. 36 T.
Carries eight 26 feet auger sections.
Required pitwidth: 50 feet
Power: 300 HP Diesel Engine
Hydraulic frame jack lift: 66" or 120"
Auger diameters: 28" to 48"
Possible drilling depth: 208 feet

Consult a Compton Engineer for Details

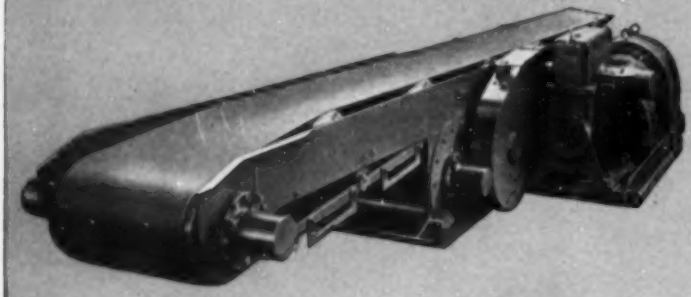
Compton, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

BOX 1946 – PHONE 4-6384 CLARKSBURG, WEST VIRGINIA

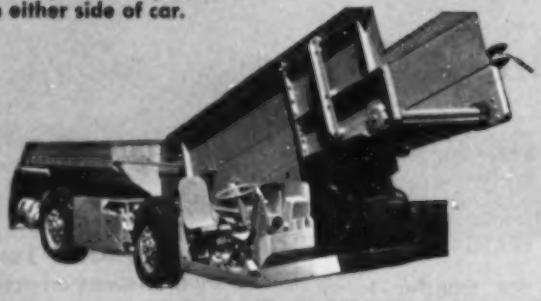
CONVEYORS

Jeffrey Belt Conveyors are used for intermediate and main haulage. They handle large tonnages rapidly and provide low-cost maintenance. These Sectional Conveyors are available in three belt widths — 30, 36 and 42 inches. Also chain conveyors in various types and sizes for face and room work.

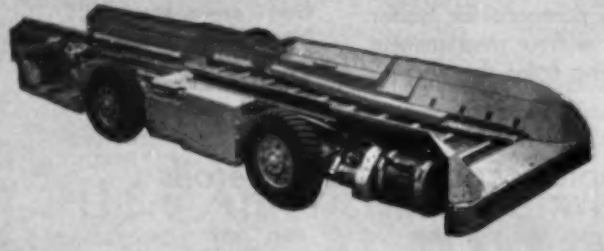


SHUTTLE CARS

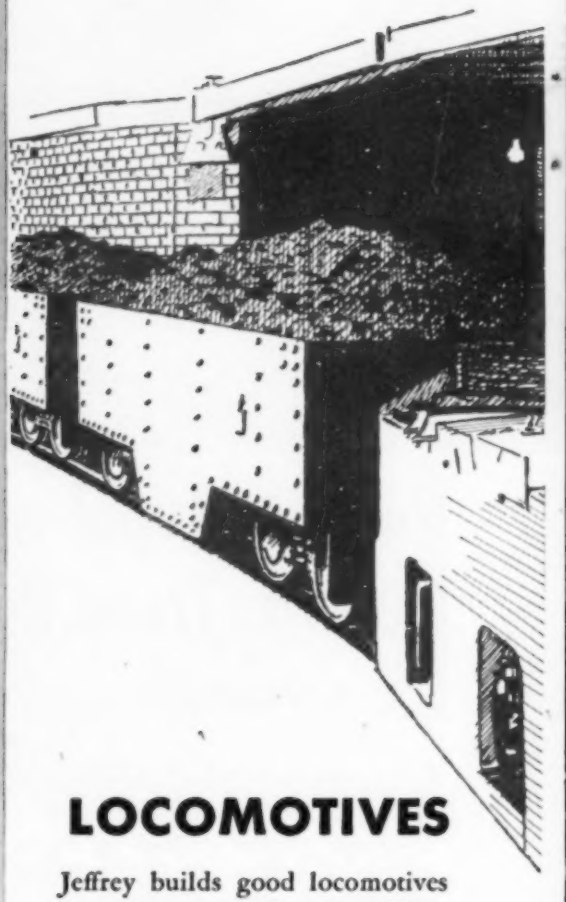
Another means of getting coal out quickly and economically. Jeffrey Shuttle Cars are ideal media between the face and main line haulage . . . are a big factor in cutting production costs. Various models with heights to suit conditions. All furnished with four-wheel drive and steering, with operator's platform on either side of car.



Above — Jeffrey 66-C4 Shuttle Car 48" high. Shows discharge end raised for elevating coal into mine cars. Accomplished by hydraulic raising and lowering device. Photo taken from operator's side of car. *Below* — Jeffrey 66-A4 Shuttle Car. It is 30" high with 6" sideboards. Also shows the operator's control pit. You'll like these new Jeffrey Shuttle Cars. They serve a definite purpose in the mine.



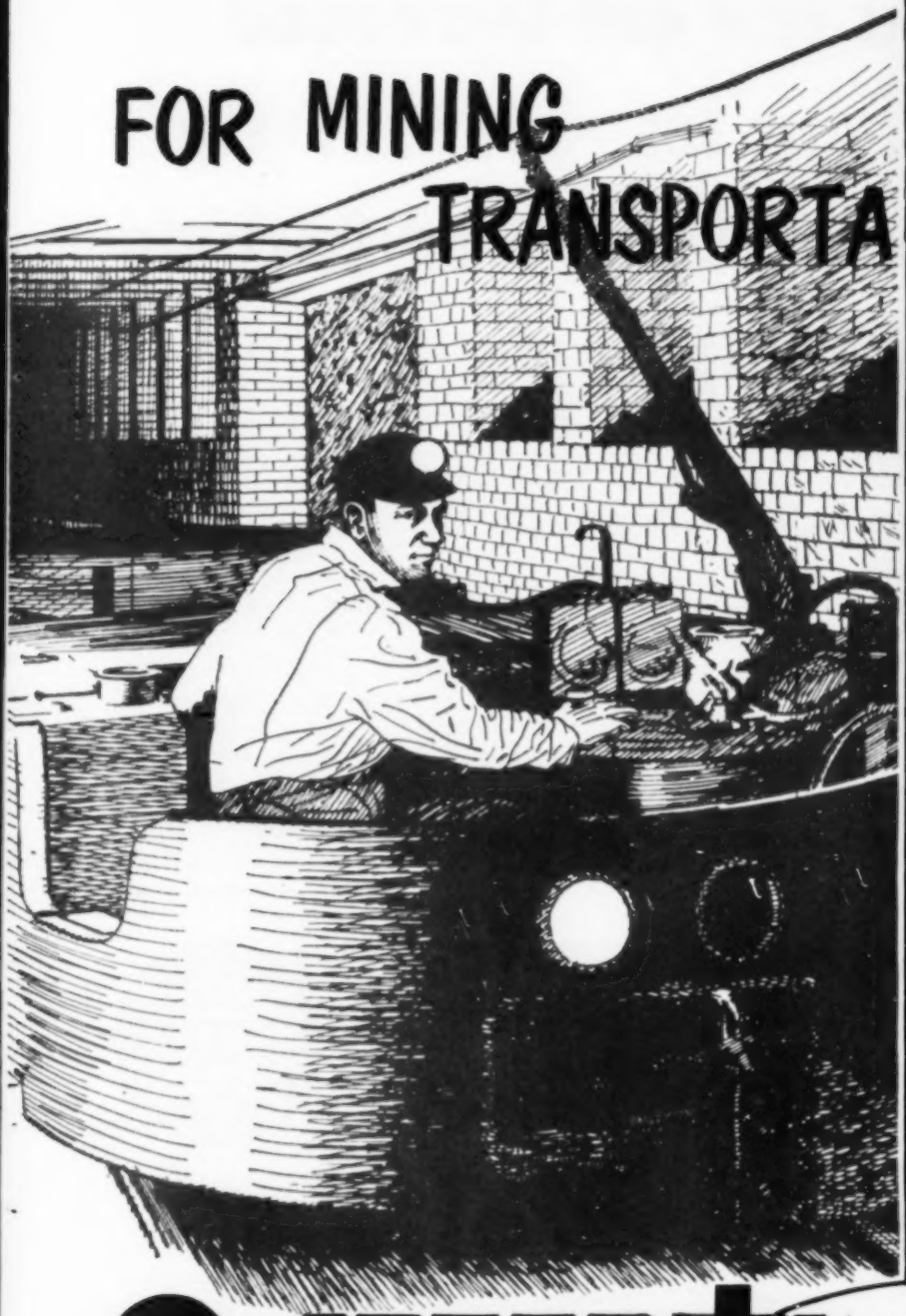
JEFFREY

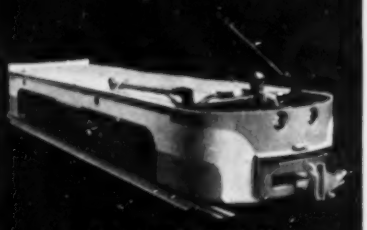


LOCOMOTIVES

Jeffrey builds good locomotives for main or secondary lines. Hundreds of new and repeat orders prove they stand up under severest haulage duty, giving reliable performance year after year. Single or tandem units, four or eight wheel, trolley or storage battery — all are backed by Jeffrey's engineering ingenuity. Call on Jeffrey for the best in modern, economical mine transportation.

FOR MINING TRANSPORTATION





Jeffrey eight-wheel Main Line Haulage Locomotive with latest features in design and construction. Built with four motors in sizes over 25 tons.

For haulage requirements up to and including 25 tons Jeffrey builds two-motor locomotives like the one shown above. It is modern in every sense of the word . . . will provide dependable transportation for many years.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . . IT'S A JOB FOR JEFFREY!

Why you can get increased tonnage . . . at less cost . . . with these Carboloy® Cemented Carbide Mining Tools

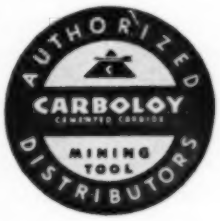
1 CARBOLOY MINING TOOLS OUTLAST STEEL TOOLS BY UP TO 50 TIMES

Carboloy Mining Tools are made of the hardest metal made by man – Carboloy Cemented Carbide. They're many times harder than the toughest steels . . . harder than any coal deposit or rock. That's why they work continuously, at faster speeds and for longer periods than steel tools. That's why they can be sharpened many times . . . long after steel tools are scrapped.

Actual mine tests prove that Carboloy Cemented Carbide Mining Tools consistently give results like these:

Production increased 10% to 20% per shift
Downtime reduced to a fraction of the time previously required
Power consumption lowered 25% to 40%
Tool replacement costs sharply reduced
Manpower and machinery conserved

2 CARBOLOY MINING TOOLS ARE STOCKED LOCALLY FOR IMMEDIATE DELIVERY



Twenty Authorized Carboloy Mining Tool Distributors, strategically located across the nation's mining areas, are prepared to give you fast delivery on all your Carboloy Mining Tool orders. Their trained specialists can give you the latest information on carbide tool use and maintenance techniques. All it takes is a call to your local Distributor, listed below:

ALA. Birmingham 2 — Young & Vann Supply Co.

COLO. Denver 17 — Mine & Smelter Supply Co.

ILL. Christopher — E & E Mine Service Co.

IND. Terre Haute — The Mine Supply Co., Inc.

KY. Harlan — General Electric Supply Corp.; Kentucky Mine Supply Co., Inc.

N. MEX. Carlsbad — El Paso Saw & Belting Co.

OHIO Cambridge — Cambridge Machine & Supply Co.

OREG. Portland — J. E. Haseltine & Co.

PA. Johnstown — General Electric Supply Corp.; Quaker Sales Corp.

Washington — Fairmont Supply Co.

TENN. Knoxville — W. J. Savage Co.

TEXAS El Paso — El Paso Saw & Belting Co.

UTAH Salt Lake City — Mine & Smelter Supply Co.

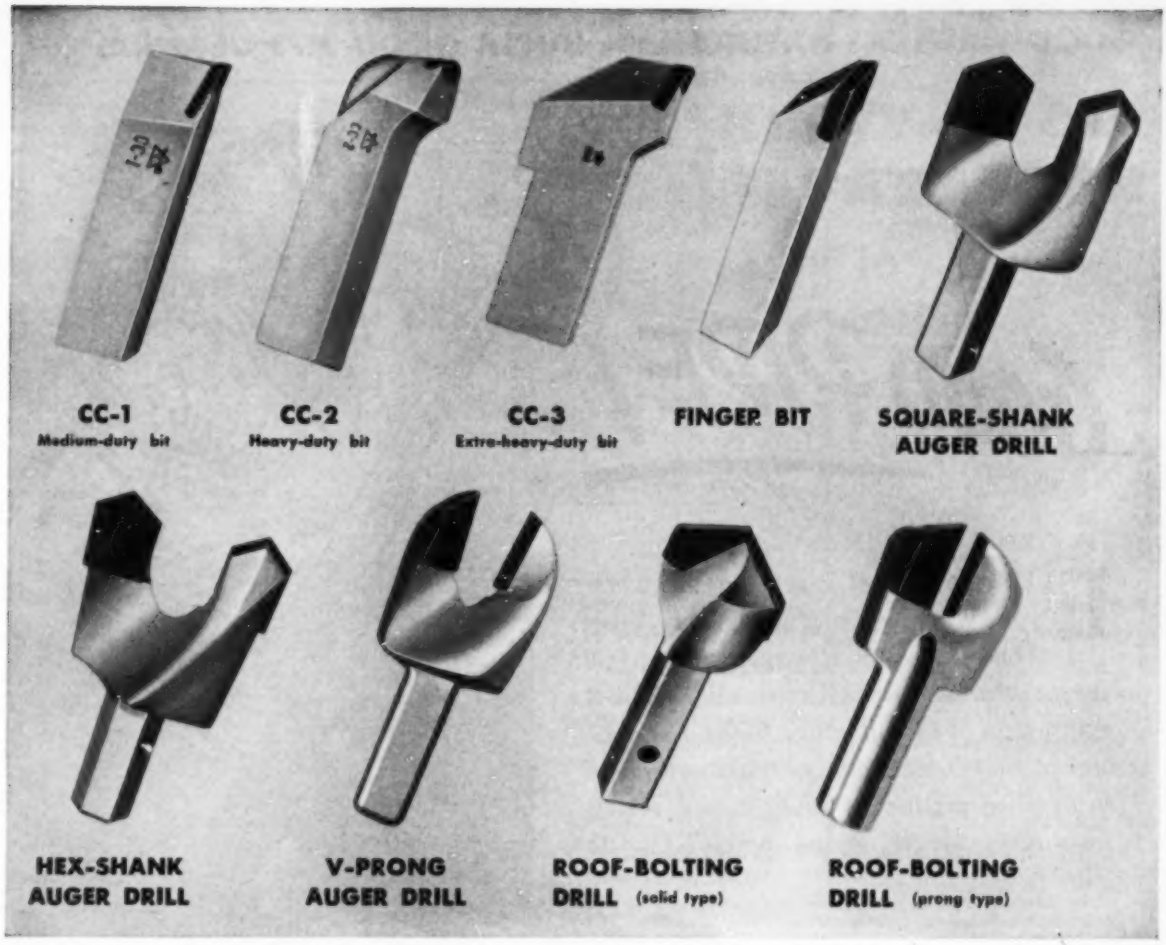
VA. McClure — Erwin Supply & Hardware Co., Inc.

W. VA. Bluefield — Bluefield Supply Co.; Rish Equipment Co.

Fairmont — Fairmont Supply Co.

Montgomery — Marathon Coal Bit Co.

Specify → CARBOLOY CEMENTED CARBIDES



3 CARBOLOY 3-POINT TECHNICAL PROGRAM HELPS YOU GET ADDITIONAL CARBIDE BENEFITS

The Carboloy 3-Point Program consists of a tuition-free training course for your key personnel, free technical literature, and free engineering field assistance. Use any or all of these free services to get the maximum production and efficiency from the carbide tools in your mining equipment. Just call your Authorized Carboloy Mining Tool Distributor or send coupon at right.

"Carboloy" is the trademark for the products of the Carboloy Department of General Electric Company

THE QUALITY BRAND OF MINING TOOLS

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DEPARTMENT OF GENERAL ELECTRIC COMPANY
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Rush me, without cost or obligation:

- ☐ Catalog and Maintenance Instruction Manual CM-110.
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- ☐ Have a Field Representative call on me.

Name _____ Position _____

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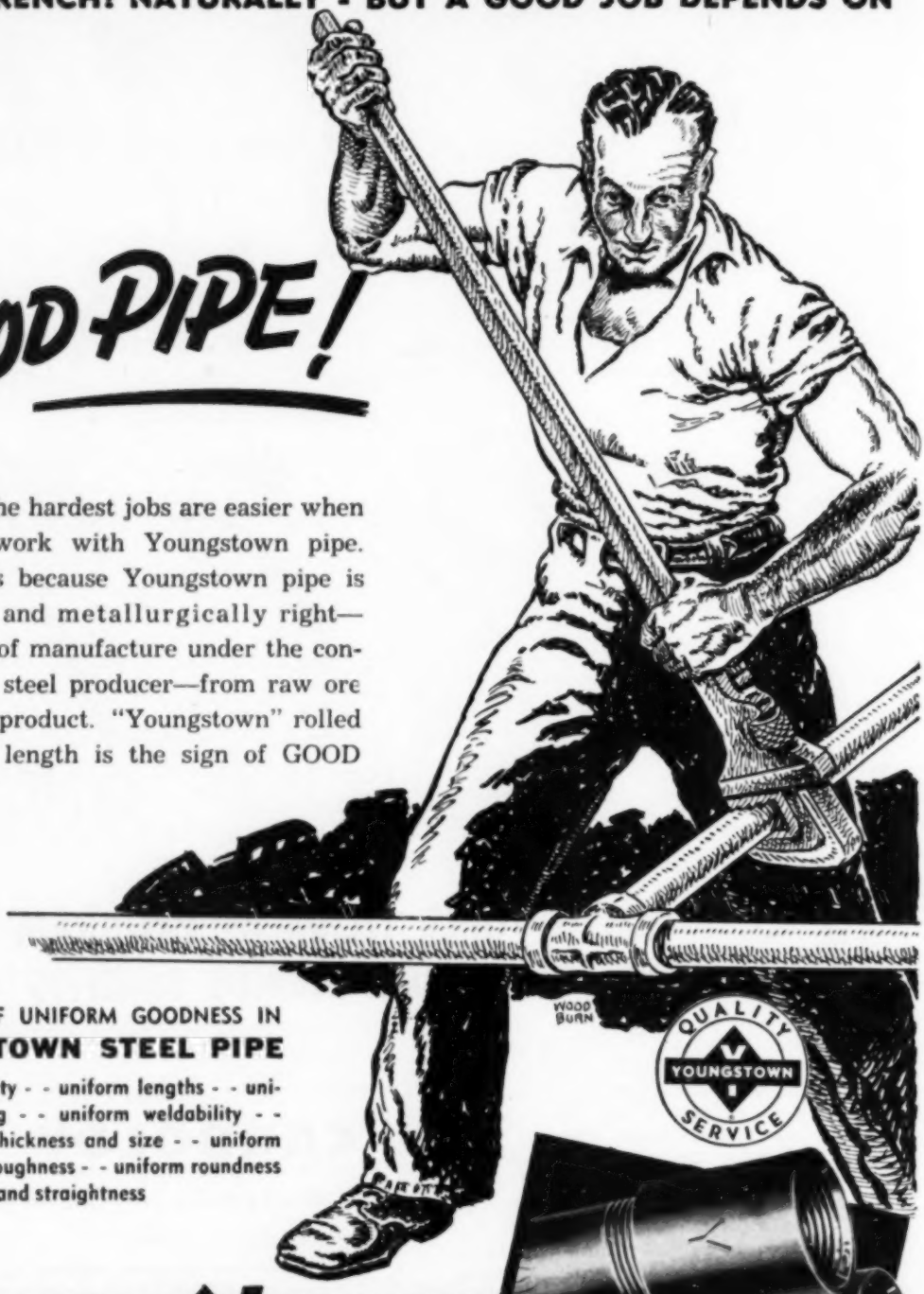
GOOD WRENCH? NATURALLY - BUT A GOOD JOB DEPENDS ON

GOOD PIPE!



EVEN the hardest jobs are easier when you work with Youngstown pipe. That's because Youngstown pipe is chemically and metallurgically right—every step of manufacture under the control of one steel producer—from raw ore to finished product. "Youngstown" rolled into every length is the sign of GOOD PIPE.

7 POINTS OF UNIFORM GOODNESS IN
YOUNGSTOWN STEEL PIPE

uniform ductility - - uniform lengths - - uniform threading - - uniform weldability - - uniform wall thickness and size - - uniform strength and toughness - - uniform roundness and straightness

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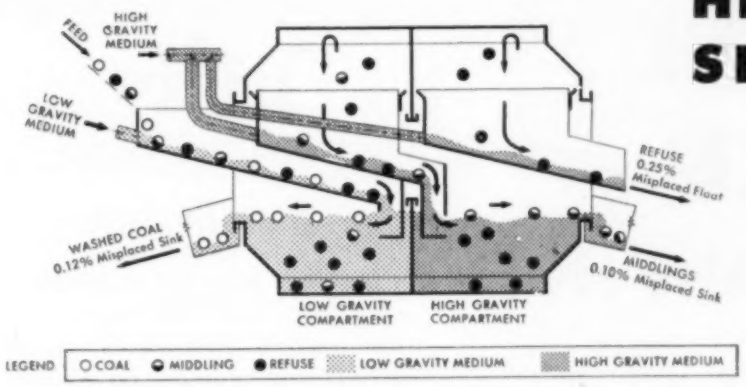
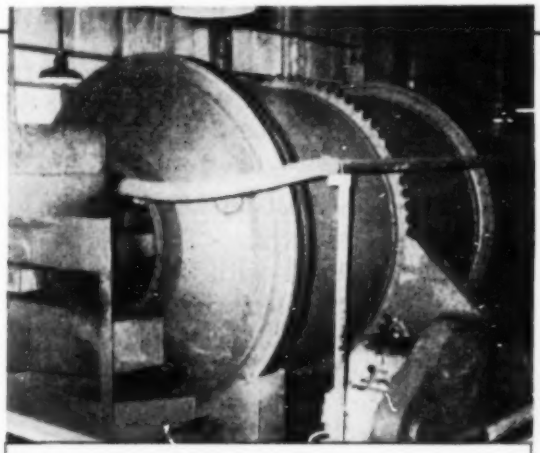
PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES

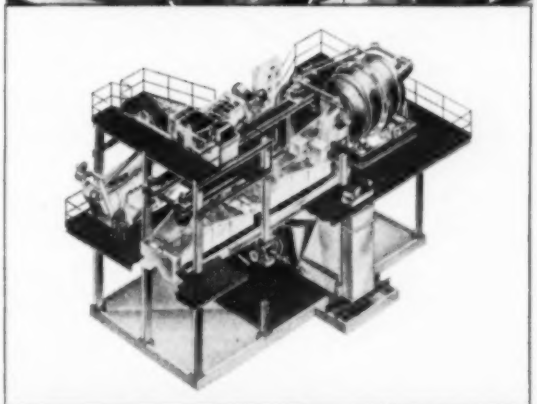
two-gravity, three-product

HEAVY-MEDIA SEPARATION

in **one** vessel







Here is how a Virginia operator uses the Wemco Mobil-Mill for accurate coal washing . . . with only 0.47% total misplaced material!

A prominent Virginia coal producer is now employing a Wemco Mobil-Mill for the precision cleaning of coal containing middling material. Using a No. 4C Wemco Mobil-Mill with an 8' x 12' Two-Compartment Drum Separator, this operator washes 114 TPH of 2½" x ¼" coal in the manner shown on the accompanying flow diagram.

OPERATING PRINCIPLE OF TWO-COMPARTMENT DRUM SEPARATOR

- True float coal is separated by a low gravity media in first compartment, while sink consisting of refuse and middlings passes to second compartment.
- True sink and middlings are separated by a high gravity media in second compartment.
- Both high and low gravity media remain uniform and constant in density in their respective drum compartments.
- The entire separation is accomplished within one unit.

The Wemco Mobil-Mill is a complete washing unit which provides exceptional accuracy and efficiency of separation for the consistent production of premium coal. It can be furnished in capacities up to 420 TPH and with three types of separators:

1. **WEMCO TWO-COMPARTMENT DRUM for coals having middling content requiring two-gravity, three-product separation.**
2. **WEMCO SINGLE DRUM for coals less complex.**
3. **WEMCO CONE SEPARATOR for coals in sizes up to 4".**

PLANTS DESIGNED TO YOUR NEEDS

Through its Western-Knapp Engineering Co. Division, Wemco offers a complete design and engineering service for the construction and equipping of complete coal preparation plants, either of the Mobil-Mill or stationary types.

RENT OR PURCHASE MOBIL-MILLS

Now you can secure the advantages of Mobil-Mill operation without delay. Take advantage of Wemco's rental, rental with option to buy or outright purchase plans.

WEMCO

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Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps Cone Separators • Drum Separators • Fagergren Laboratory Units • Agitators Fagergren & Steffensen Flotation Machines • Hydroseparators • S-H Classifiers HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

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"Now Getting More Than

TWICE THE SERVICE

...Since Switching to

Tuffy Draglines"

Says Operator of Large Pennsylvania Coal Stripper...

Longer Service Life Of Tuffy Results in BIG SAVINGS for Mine Operators

"Previous average dragline service was 300 hours; now getting 700 hours — with Tuffy Drags." *(name on request)*

This report from the Pennsylvania coal fields is typical of hundreds received from mine operators who have cut dragline costs in half when they switched to Tuffy Draglines.

You can expect similar results on your jobs—because Tuffy Drags are designed with extra flexibility, extra abrasive resistance and extra toughness to move more material for longer periods of time. Make your own test! Install a Tuffy Dragline on a single piece of equipment and compare its performance with others. See how much longer and better it will serve you.

UNION WIRE ROPE CORP

union Wire Rope corporation

Specialists in Wire Rope and Braided Wire Fabric

Tuffy SCRAPER ROPE

Gives Longer Runs at Lower Costs on All Types of Wheel Scrapers

Here's why! Tuffy is tailored to take • Greater drum crushing abuse • Sharper bends over smaller sheaves • Angle pulls through swivel mounted sheaves • Crawling on flanges of guide rolls and edges of sheave boxing • Multiplied impact shock of load on slack lines. Next time you order, say "Tuffy." Test it on your scrapers.

Tuffy DOZER ROPE

Stops Rope Wastage—Cuts Costs

Users report increases in rope service up to 300%! Until now it has been necessary to throw away 40' to 50' of good rope whenever 10' is damaged. Now, you can stop this waste! With a reel of Tuffy Dozer Rope mounted on the tractor back of the wedge socket, you just feed through enough to replace the 10' or so that is cut or crushed on the drum! Not only do you stop costly rope wastage, but also you eliminate half the down time caused by rope replacement.

Other Specially Designed Tuffy's For Special Uses

Tuffy SLINGS

9 part machine-braided wire fabric construction fights off knots and kinks, stands up longer than ordinary wire rope. Proof-tested to twice safe working load.

Tuffy MINING ROPE

Crab Motor Ropes, Winch Ropes to fit your needs—all Union-formed (Pre-formed) and designed to give maximum safety and service—at ultimate low cost.

Tuffy. SLUSHER ROPE

Improved 3 x 19 gives maximum resistance to abrasion . . . is rigid, non-collapsing to eliminate drum crushing, yet elastic and flexible enough to take up shock loads.

6

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Specialists in Wire Rope and Braided Wire Fabric

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Please send me illustrated folder on:

☐ Tuffy Dragline ☐ Tuffy Scraper Rope ☐ Tuffy Slings
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where STEADY OUTPUT COUNTS MOST

you can count on BUCYRUS-ERIES

WHEN he's at the controls of a Bucyrus-Erie, like the 38-B shown here, a shovel operator quickly becomes an expert at keeping trucks loaded and on the move. That's because it's so easy to set a fast steady pace, so easy to keep it up all through the shift — and to repeat the process day after day, month after month.

Behind this steady dependable performance is Bucyrus-Erie *individual design*. Like every other model in the line, the 38-B is an entirely separate unit, engineered from the ground up for its particular work range. It has just the right combination of speed, power, strength and weight for big output and economical operation. As a result, you get a smooth fast work cycle, low operating costs, low maintenance, and the dependability that always keeps your coal on the move to the tipple.

Ask your nearby Bucyrus-Erie distributor for complete details on how Bucyrus-Erie *individual design* can speed up your operations. For information on large excavators for loading and stripping, write us direct. 41E53

BUCYRUS ERIE

¾- to 4-yd. Diesel, Gasoline or Single-Motor Electric Convertible Excavators

BUCYRUS-ERIE CO. • South Milwaukee, Wisconsin

The chain that... thrives on abuse!

Standard Rivetless Chain available in 4" to 9" pitches to fit standard equipment.

The more it's used the harder it gets!

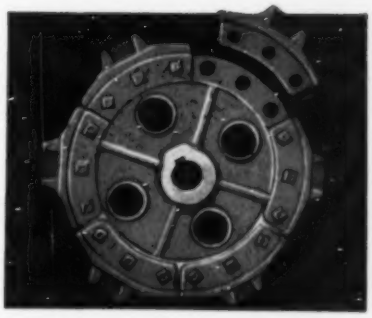
That's because it's made from KENKROME, the remarkable wear-defying alloy that was perfected after years of experimentation by Kensington engineers and metallurgists.

KENKROME is no ordinary steel ... in fact it's no ordinary manganese steel. There's no other steel quite like it.

Addition of special alloying metals under a patented process, plus Kensington's own scientific method of heat treatment, have created this remarkable metal which outwears ordinary steel *2 to 4 times* ... which actually defies wear by developing surface hardness under impact to better enable it to withstand abrasion. Beneath this continually hardening surface, the metal always remains tough ... better able to withstand shock than metals that are hard all the way through.

But Kensington's wear-conquering engineers didn't stop with development of the metal itself. They improved the design of many standard parts ... reinforced those which needed strengthening ... reduced the number of moving and wearing parts on some ... reshaped others to add extra service life.

The renewable tooth sprocket, shown at the right, is a good example of Kensington's improved design. When outer segments need replacing, the entire change can be completed by a couple of men during lunch hour ... without even removing the chain. A new set of teeth costs only a fraction of what you'd pay for a complete one-piece sprocket.



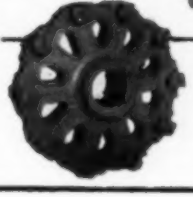
KENKROME chains and sprockets are built to fit all standard conveyors and elevators used in mines and preparation plants. Consider the low initial cost, low replacement cost, and advantages of continuous, uninterrupted plant operation. It will pay YOU to *Switch to KENKROME!*

To find what it would cost, fill in and mail coupon. You'll be under no obligation.

Other wear-resisting alloyed ORO manganese replacement parts

Long-wearing, long lasting dipper tooth points and bases.

Treads for all sizes and types of shovels and draglines.



Crawler sprockets available for most shovels and draglines.

Kensington STEEL COMPANY

KENSINGTON STEEL CO., Dept. C, 505 Kensington Ave., Chicago 28, Ill.

SUBSIDIARY OF POOR & COMPANY • CHICAGO

☐ Please quote prices ☐ Please ask salesman to call

Chain Information { CHAIN NO. ____ TYPE ____ LENGTH ____ ATTACHMENT NO. (OR 2 BOLT PINS) ____ SPACED EVERY ____ PITCH

Sprocket Information { CHAIN NO. ____ NO. TEETH ____ SHAFT DIA. ____ HUB LENGTH ____ CENTRAL ☐ KEYWAY ____ OFFSET ☐ BUSHED ____

NAME ____

COMPANY ____

ADDRESS ____

CITY ____ ZONE ____ STATE ____

"Save money?

Sure!"

THAT, in a nutshell, tells you why so many wire rope users in the mines prefer Roebling wire rope . . . it speeds up operations . . . lasts longer on the job . . . saves money that really adds up.

For the last word in wire rope efficiency and economy, call your nearest Roebling office or distributor for a Roebling recommendation.

ROEBLING
A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 19228 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 331 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

V & C Coal Corporation finds that **4,000-foot belt reinforced with "Cordura" gives trouble-free service in 8-hour-per-day operation**

View of loading point inside mine. The main belt, reinforced with Du Pont "Cordura", is loaded by feeder belts from the different cross entries where the coal is dug. It operates under low-ceiling conditions . . . with considerable dust or dampness.

The entire production of the V&C Coal Corporation's mine, at Grays Knob, Ky., depends on the performance of the main conveyor belt, shown above, which operates continuously for 8 hours per day. Produced by the Manhattan Rubber Division of Raybestos-Manhattan and sinewed for strength with Du Pont Cordura* High Tenacity Rayon, this belt has been steadily extended to reach new working areas . . . now is 4,000 feet between centers. The mine operators report that they have never had any trouble with it . . . though the belt it replaced had broken down at times while operating on 2,800-foot centers.

The high strength of Du Pont "Cordura" makes possible belting that's stronger, yet thinner, for better troughing and training. And the low stretch of "Cordura" saves costly shutdowns for take-up and resplicing.

Before you order your next conveyor belt, inquire about the use of "Cordura" rayon in belts. We'll send you the names of suppliers . . . together with full information. Just write for your free copy of "Sinews for Industry." Address: Textile Fibers Dept., Room 2520-C, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Plenty of heart for tough jobs!

INTERNATIONAL RF-210 Series.
GVW ratings, 37,000 to 45,000 lbs.
Gasoline, LPG, or diesel power.

The heart of the 6-wheel truck is the *bogie*. INTERNATIONAL's bogie has been performance-proved on the tough jobs. Proved beyond a doubt by INTERNATIONAL's 18 straight years of 6-wheel sales leadership.

INTERNATIONAL brings you this advanced bogie design in *America's most complete line of 6-wheelers*—the widest choice, by far, of models, engines, transmissions, and axle ratios. No other 6-wheelers provide such exact truck-to-job specialization!

Ask your INTERNATIONAL Dealer or Branch for all the facts—and a demonstration. Time payments arranged.

INTERNATIONAL HARVESTER COMPANY · CHICAGO

OUTSTANDING ADVANTAGES OF THE INTERNATIONAL BOGIE

The third differential and power divider allow each wheel to rotate independently. There is practically no tire scuffing, "axle fight," or power loss. Perfect matching of tires is unnecessary. Fuel consumption is lower. Under adverse conditions, the third differential can be locked out, giving positive traction on all wheels.

Abnormal tire wear eliminated because INTERNATIONAL bogie design *always* keeps wheels parallel to frame.

Reduces road shock by 50%. "Walking action" design keeps chassis frame and body level while bogie "walks" over obstructions and levels out the road.

Extra strength without extra weight. More payload per pound of chassis weight results from elimination of unnecessary dead weight. Strength is concentrated where needed.

Load stresses equalized. Load is carried from the frame to the axles at *four* points.

23 NEW 6-WHEEL MODELS { GVW ratings, 22,000 to 90,000 lbs. Engines from 130 to 356 horsepower. Choice of gasoline or LPG fuel systems. Diesel engines available for models with GVW ratings of 30,000 lbs. and over. Transmissions and axle ratios to meet any requirement. America's most complete truck line—170 basic models from ½-ton pickups to 90,000 lbs. GVW off-highway models.

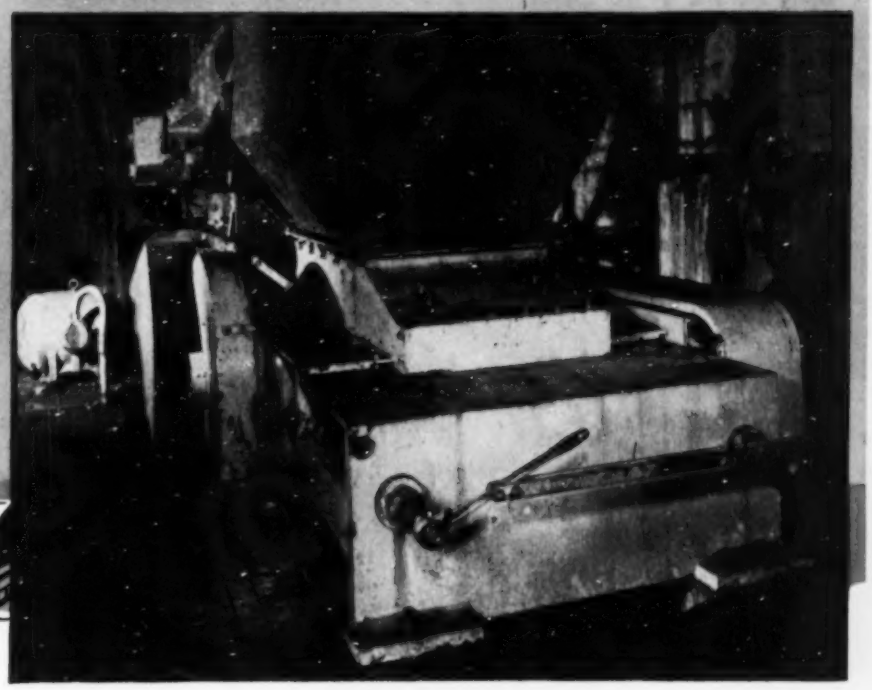
International Harvester Builds McCORMICK® Farm Equipment and FARMALL® Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

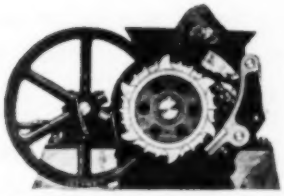
Better roads mean a better America

INTERNATIONAL TRUCKS
Standard of the Highway

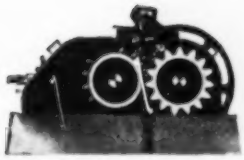
COAL SIZING NO PROBLEM

Jeffrey 30" x 36" Double Roll Crusher sizing coal in a large Preparation Plant. Feeding the crusher in controlled amounts is a Jeffrey-Traylor electric vibrating Feeder (shown in rear of view at the right).

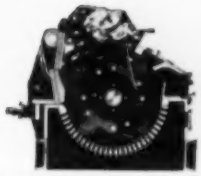




Cross-section of Jeffrey Single Roll Crusher. Reduces lump coal to 1½" and larger in one operation.



This cross-section shows a Jeffrey Double Roll Crusher, a unit which will handle entire mine output without preliminary sizing or picking. Product range from 4" to 12".



FLEXTOOTH Crusher sectional view. Takes lump coal up to 24" and reduces it to stoker size in a single operation.

Coal Cutters	Underground Conveyors	Belt Conveyors
Loaders	Drills & Drilling Mach.	Jigs
Locomotives	Transmission Machinery	Crushers
Shuttle Cars	Replacement Parts	Feeders
Fans & Blowers	Scraper Conveyors	Loading Booms

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

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PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!

IN MINES and QUARRIES

JOB AVAILABILITY PAYS OFF!

Euclid Bottom-Dump Coal Haulers of 20 to 40 ton capacities have diesel engines to 300 h.p. . . . loaded speeds up to 34.4 m.p.h.

Rear-Dump Euclids of 10 to 34 ton capacity have travel speeds to 36.3 m.p.h. with full payload and diesel engines of 125 to 400 h.p.

For open pit mining and quarry operations, Euclids are unmatched for job availability and long service life. "Eucs" have large capacity and plenty of power and speed to move more loads per hour at more profit per ton.

Bottom-Dump Euclids are engineered and built as complete units with good weight distribution, and tremendous power. Short wheelbase of the tractor and the universal hitch design make them easy to handle and permit short turns in narrow cuts.

Rear-Dump "Eucs" have body designs for all types of materials—coal, ore, rock, overburden and other heavy excavation. Their rugged construction withstands the impacts of loading heavy materials and travel on rough roads—assures low operating and maintenance costs.

Put Euclids on the job and be on more jobs! Ask your Euclid Distributor for information on the models best suited to your off-the-highway hauling requirements.

The EUCLID ROAD MACHINERY Co.
Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

PUMP'S FINE TODAY... BUT HOW ABOUT TOMORROW?

With Rex and only Rex

You're assured new pump efficiency for the lifetime of the pump because . . .

ONLY REX HAS THE ADJUSTABLE AIR PEELER!

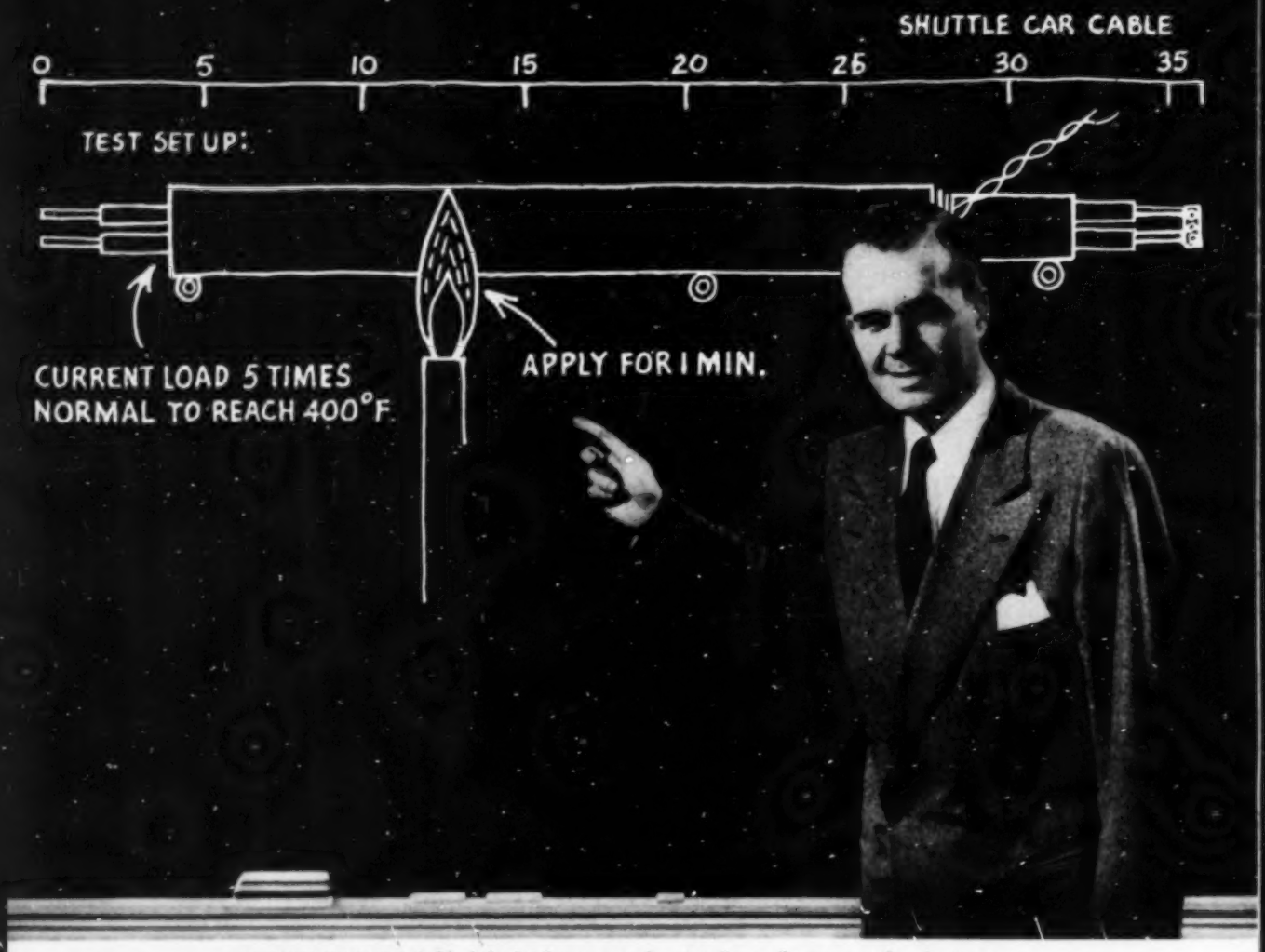
Every self-priming, centrifugal pump must have an air peeler to remove air from the suction line and create the vacuum that draws water up to the impeller. Normal wear on the peeler and fast-moving impeller destroys the necessary close clearances between these parts . . . reducing both priming and pumping efficiency.

Here's where *Rex alone* can maintain original priming and pumping efficiency for life. A simple adjustment of the *exclusive Patented Adjustable Air Peeler* and you've restored its original close clearance with the impeller. Just a twist of the wrist and you've restored new pump efficiency . . . for today . . . and tomorrow.

Get all the details on this and other exclusive Rex features from your local Rex distributor or write to Chain Belt Company, 4786 W. Greenfield Ave., Milwaukee 1, Wis.

CHAIN BELT REX COMPANY

CONSTRUCTION MACHINERY



APPROVED USBM TEST: Cable fails if it burns more than 6 inches or flames more than 3 minutes.

NO ANACONDA CABLE EVER FAILED THIS TEST

The U.S. Bureau of Mines flame-test for trailing cables is tough. But ANACONDA Cables have passed every time...*with ease*. That's not all! Performance-wise, a recent survey of shuttle cars in 15 mines found ANACONDA Cables last up to 300% longer than cables used only a few years ago.

NEW FEATURES GIVE CABLE STAMINA

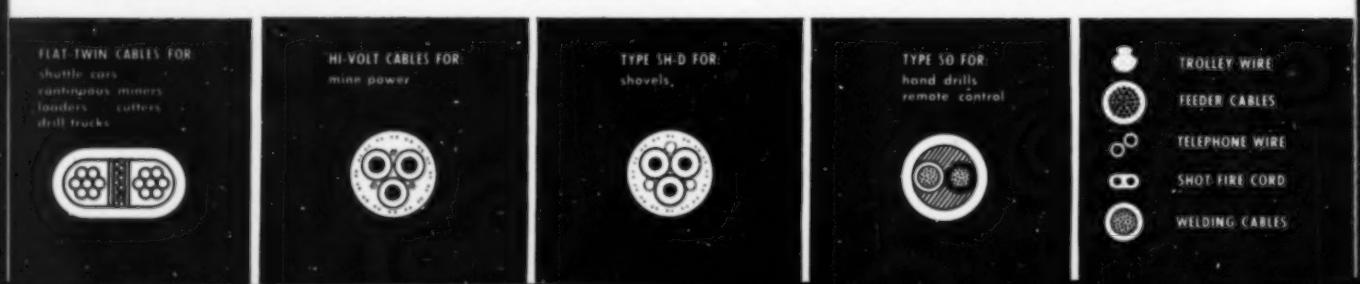
These facts are as good a certificate of quality as any we know. As new features have been added to ANACONDA Shuttle Car Cables, each has been repeatedly tested on special, scientifically designed equipment. A new improved neoprene jacket is tougher, more flame-resistant. You'll find more strength and heat-resistance in the new cold-rubber insulation. The cable has also been stranded in a new and decidedly better way. No wonder it can take more abuse from overloads, compression-cutting, sliver-cuts in wet mines, rib-pinching, runovers and dragging. Patented breaker strip* and balanced tensile strength of ground and power conductors make it safer to use.

A CLOSE LOOK AT CABLE COSTS

Examine this cable yourself. Ask your Anaconda Sales Office or Distributor for a sample. Test it . . . tear it apart. Then look at the cost of *one* shutdown on any working face of your mine caused by *one* break in cheap cable. It far exceeds any possible saving from buying cable on price. Your own production figures soon prove the value of quality cable. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.* *U. S. Patent No. 2,455,772

ANACONDA®

TODAY'S HEADQUARTERS FOR MINE CABLE



Here Are Facts You Should Know About Electric Motor Bearings

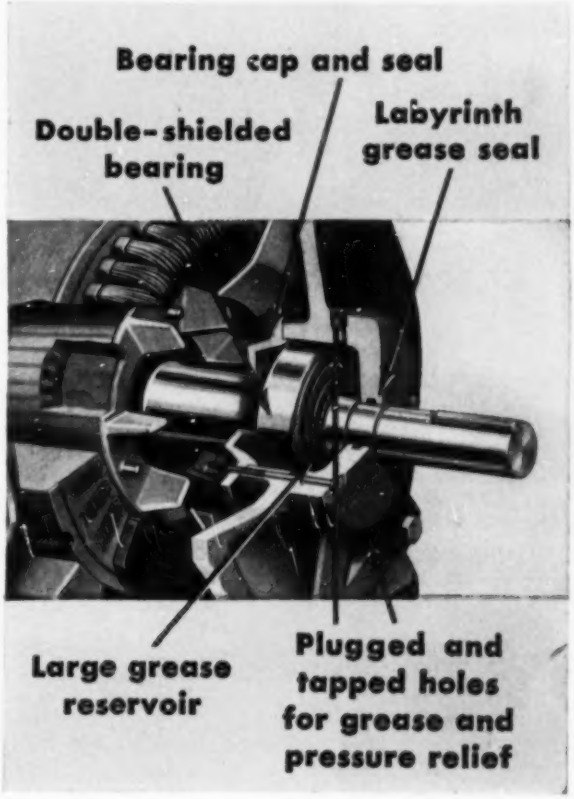
AN ideal motor bearing would operate for indefinitely long periods under all types of conditions without requiring any attention whatever. However, in the opinion of our engineers, such a bearing and its attendant lubricant are not yet available on the commercial market. Consequently, bearings for many types of operations, particularly where overloading, extreme temperature ranges and chemical and dirt laden atmospheres are involved, require special lubricants or regular lubrication schedules.

Of course, bearings suitable for many kinds of operation under normal conditions can be built to require no attention for very long periods — usually several years. Allis-Chalmers can supply sealed bearings in all frame sizes through 505 on short delivery and without extra cost for applications of this type.

Which is the Best Design for *Your* Application?

We believe that the design used in standard Allis-Chalmers drip-proof, tefc and explosion-proof motors represents the best design for most industrial users.

The Allis-Chalmers standard design consists of a pre-lubricated, double-shielded bearing mounted in the end housing with a generous grease reservoir. Plugged and tapped holes are provided for grease and for pressure relief. Under normal operating conditions, this design will operate as long without attention as any other type of bearing in use today. But where difficult operating conditions make re-lubrication desirable, it can be done as part of the normal lubricating routine without dismantling the motor.


Bearing cap and seal
Double-shielded bearing
Labyrinth grease seal
Large grease reservoir
Plugged and tapped holes for grease and pressure relief

The large grease reservoir and shielded bearing design assure that grease lost from the bearing due to high operating temperatures or other causes will be replaced automatically.

For further information on bearing design and other features of Allis-Chalmers motors, call your nearby Allis-Chalmers District Office or Authorized Distributor.

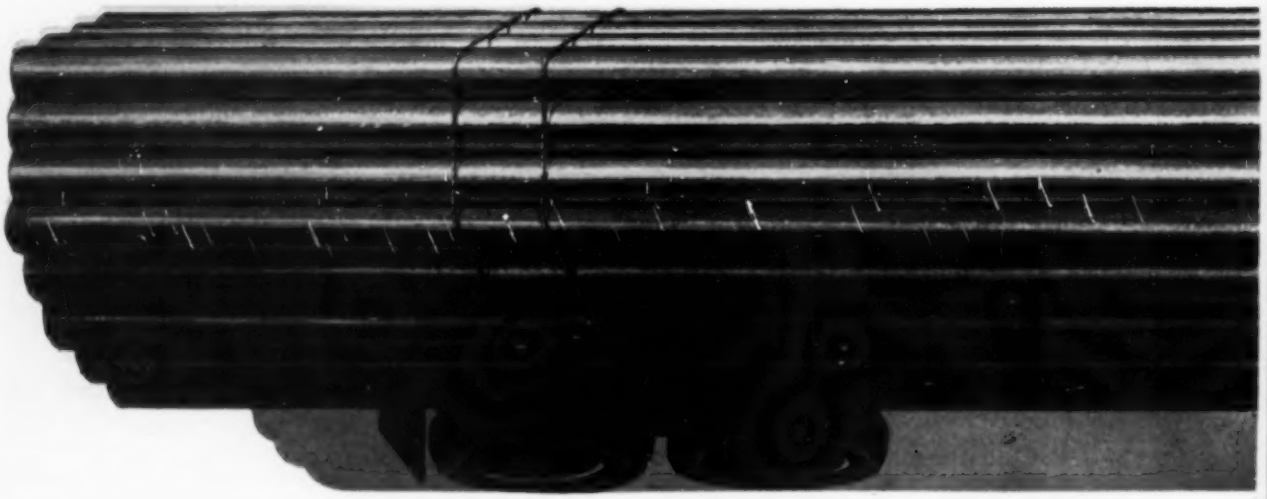
A-4147

ALLIS-CHALMERS

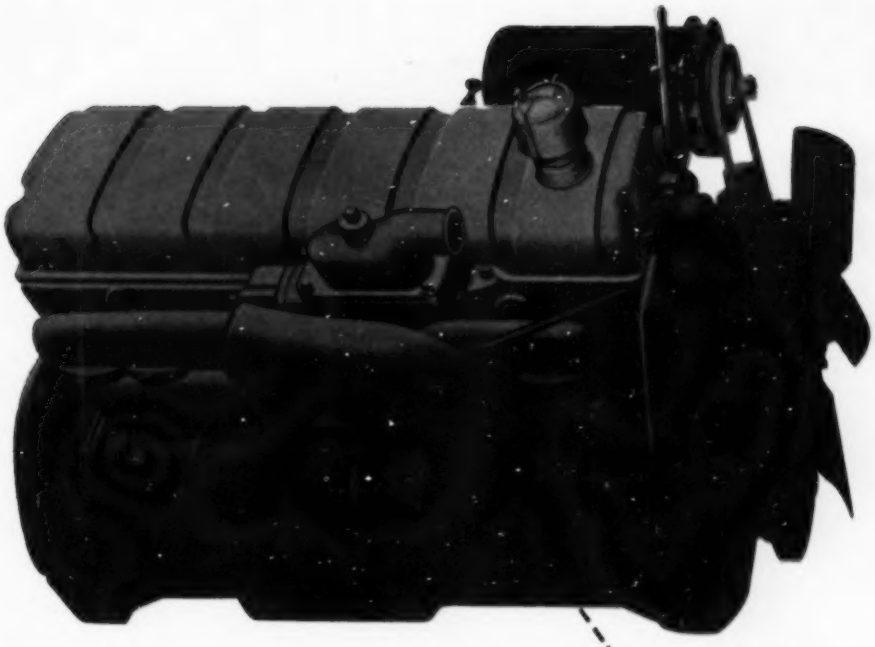
Milwaukee 1, Wisconsin

If you operate medium heavy-duty trucks ...

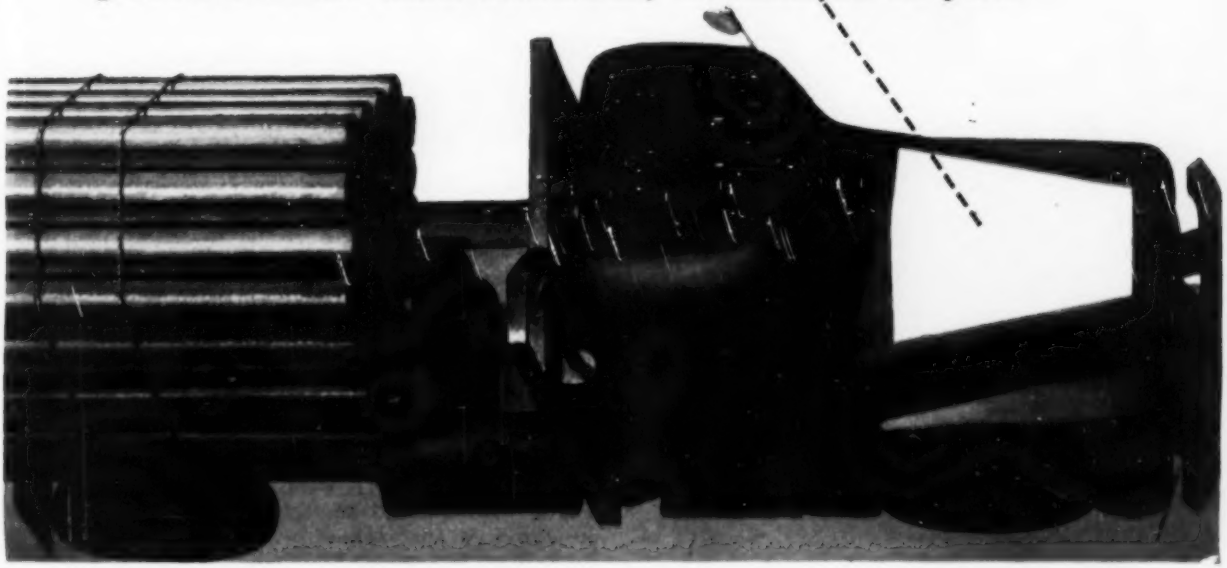
This new 150 h.p. diesel <u>now</u> makes Cummins



CUMMINS



performance and economy available to you



It's Cummins new Model JBS-600—ready to serve in the medium heavy-duty trucks produced by leading manufacturers. Ready to bring to this field the performance that has made Cummins the leader among high-output diesels. 150 h.p., the JBS-600 delivers full rated power for faster acceleration . . . for reserve stamina when the going is tough.

JBS-600 operators report more miles per gallon . . . lower fuel costs. This demonstrates the fact that Cummins' exclusive fuel and injection system—together with four-cycle operation and use of inexpensive Number 2 diesel fuel—naturally leads to savings on the job. The JBS-600 is ready to work profitably for you. It's Cummins-engineered for a long and useful life.

For all the facts—see your Cummins dealer!

Cummins® Engine Company, Inc. • Columbus, Indiana

Leaders in rugged, lightweight, high-speed diesel power

Dewater Coal Fines with Eimco Filters

This photograph shows an Eimco Agidisc test filter unit which is available for pilot plant filtration work in your own processing plant.

This test filter incorporates all the features which enable Eimco's full production size machines to give that all around superior performance.

Tank agitation for uniform cake build up, all metal, high-drainage sectors, metal filter cloth, rubber scrapers, automatic valve, vari-speed drive and many other production unit advantages are built into this test unit.

For information on use of this equipment, write today to The Eimco Corporation, Salt Lake City, Utah.

Coal fines washed out of mine run coal in the cleaning plant represent a product worth saving both in quantity and quality.

Many companies in coal mining districts all over the Country are finding that compliance with anti-pollution laws is actually going to return them a profit.

Eimco filters used in dewatering coal fines have been selected by most progressive companies because: (1) Eimco offers the only reliable, heavy-duty unit for the job that is simple and free of trouble making gadgets. (2) Eimco's will operate continuously with a minimum of attention. (3) Cakes on Eimco filters are smooth and uniformly dried over the entire surface. (4) More tonnage is filtered per square foot per hour. (5) Eimco discs and Agidisc occupy less floor space per square foot of filter area. (6) Better filter bag life, and many other advantages.

Write for more information.

EIMCO A481

THE EIMCO CORPORATION

The World's Leading Manufacturer of Vacuum Filtration Equipment

EXECUTIVE OFFICES AND FACTORIES: SALT LAKE CITY 10, UTAH, U. S. A.

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KELLOGG, IDAHO, 307 DIVISION ST. • LONDON W. 1, ENGLAND, 190 PICCADILLY

IN FRANCE: SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND: EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
IN ITALY: EIMCO ITALIA, S.P.A., MILAN, ITALY

6 WAYS TIMKEN® BEARINGS CUT HAULING COSTS!

Proved on over half a million mine cars!

To cut the cost of hauling coal and ore, more than 500,000 mine cars are now rolling on Timken® tapered roller bearings. Here are 6 big reasons why:

1. **GREATER RESISTANCE TO SHOCK LOADS.** Timken tapered roller bearings are made of Timken fine alloy steel and case-hardened to provide a wear-resistant surface over a tough, shock-resistant core. They take the pounding of mine car service with minimum time-out for maintenance and repairs.

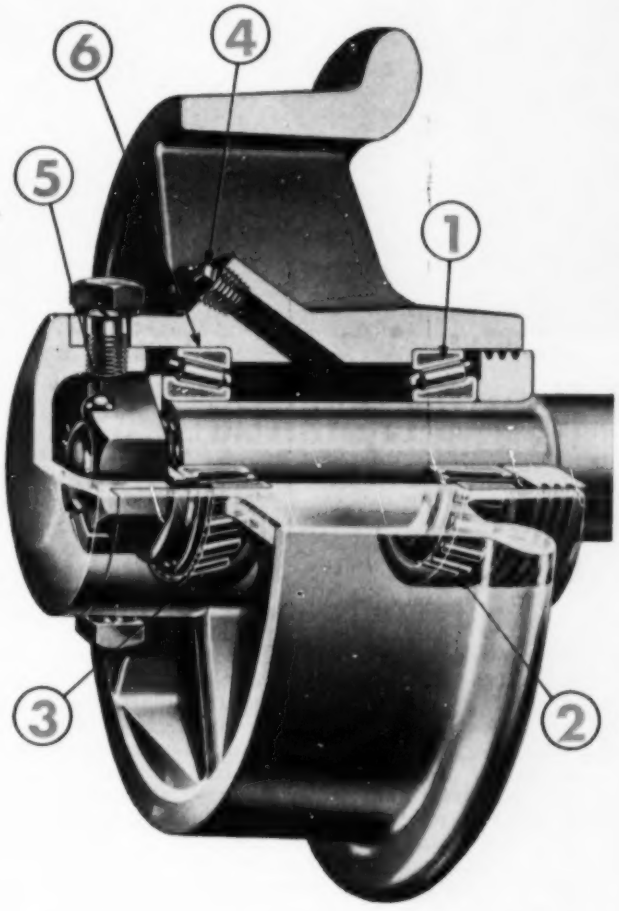
2. **GREATER CAPACITY.** Because of line contact between rollers and races, Timken bearings have extra load-carrying capacity.

3. **EASY STARTING, LONGER TRAIN LENGTHS.** True rolling motion and incredibly smooth surface finish of rollers and races in Timken bearings practically eliminate friction. More cars per train can be hauled with no increase in power requirements.

4. **LESS LUBRICATION.** Closures are more effective because Timken bearings keep hubs and axles concentric. Lubricant stays in—dirt and moisture stay out.

5. **SIMPLIFIED INSPECTION.** Wheels can be easily removed for bearing inspection by simply pulling the cap, cotter pin and nut.

6. **NO NEED FOR SPECIAL THRUST PLATES.** Timken bearings take radial and thrust loads in any combination because of tapered construction. No special thrust plates are required, cars take curves easier.



Get these cost-saving advantages for *your* mine cars by specifying Timken tapered roller bearings. Write The Timken Roller Bearing Company, Canton 6, O. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

Cut your hauling costs by specifying **TIMKEN** TAPERED ROLLER BEARINGS

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST →▯← LOADS OR ANY COMBINATION →▯←

BROAD CRAWLER TREADS ENABLE G-E SHUTTLE CAR TO EASILY NEGOTIATE SOFT OR WET BOTTOMS, EVEN WHEN FULLY LOADED

New G-E Shuttle Car Proving Ideal for All Types of Mining Conditions

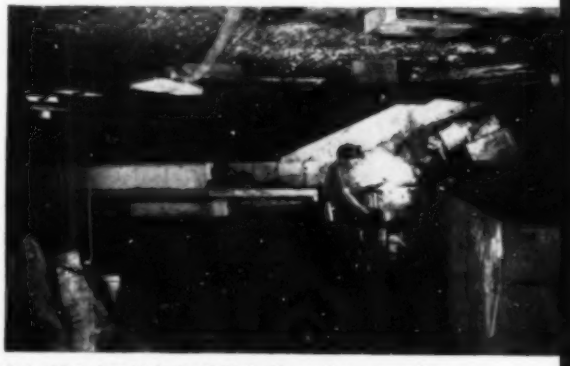
Low ground pressure, greater maneuverability, lower maintenance costs made possible with crawler treads

Using crawler treads instead of rubber-tired wheels, the new General Electric shuttle car is proving its efficiency and versatility under all types of mining conditions. Fully loaded, the car has only 20 pounds per square inch ground pressure. With a 14 to 16 foot turning radius, the car is ideal for operation where tunnels are narrow and turns are sharp. The wide conveyor, which is made possible by the use of crawler treads and the absence of wheel-wells, increases carrying capacity up to 300 cubic feet (with 12-inch sideboards).

The G-E shuttle car is simplicity itself in design and ease of operation. All motors and controls, though well-protected from abrasive materials and meeting U.S. Bureau of Mines' specifications, are easily accessible for servicing and maintenance.

Whatever mining conditions you face—no matter how rigorous they are—the new G-E cable-reel tracklaying shuttle car can meet your requirements of service and economy. For complete information contact your nearest G-E sales office. General Electric Company Schenectady 5, New York. 120-65

1879 75 1953 YEARS OF ELECTRICAL PROGRESS



Only 42 inches high, the G-E shuttle car has a carrying capacity 30 per cent greater than cars of conventional design. Car above, at Jamison Coal and Coke Co., Hostetter, Pa., shows simplicity of unloading in tight quarters.

You can put your confidence in—

GENERAL ELECTRIC

Remember it's Jalten* for

- HIGH STRENGTH
- GOOD FORMABILITY
- RESISTANCE TO CORROSION
- RESISTANCE TO ABRASION

You'll find the data you want in this book . . . send for your copy TODAY! Features of this book show how JALTEN can help you build better products:

- Chemical Properties of Jalten
- Mechanical Properties of Jalten
- Jalten Equivalents
- Jalten Application Data

*J&L's new JALTEN series replaces the famous Otiscoloy line and may be selected in the following combinations of advantages:

Jalten No. 1—High strength, good formability and fabricating, good low temperature.

Jalten No. 2—High strength, impact resistance, moderate forming—improved resistance to atmospheric corrosion.

Jalten No. 3—High strength, moderate forming—improved resistance to abrasion.

J&L STEEL

Jones & Laughlin Steel Corporation
411 Liberty Avenue, Gateway Center, Pittsburgh 30, Pa.
Please send me a copy of "Jalten . . . the low alloy high strength steel."

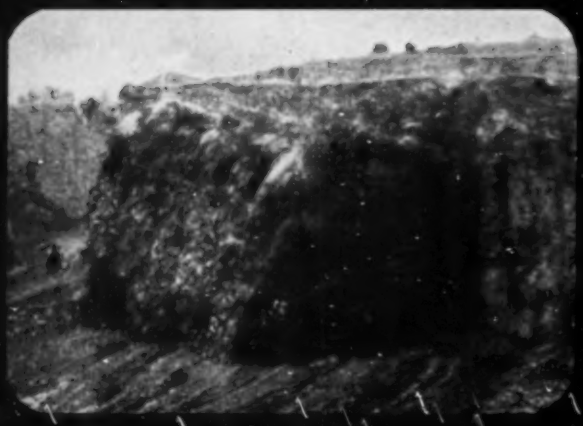
Name_____

Company_____

Address_____

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH

Here's how ROCKMASTER® reduces noise



The noise your neighbors hear . . . and complain about . . . is air blast. It is the noise of wasted explosive energy that escapes into the air before it has done its job on the burden. Such noise is difficult to avoid when holes are spaced too closely and detonation begins at the top. This waste of power occurs because the explosives force seeks the path of least resistance.

By allowing initiation at the bottom of the holes, the ROCKMASTER Blasting System can keep the explosives force under prolonged confinement . . . as shown in the above photos taken at the height of four different ROCKMASTER blasts. Each photo shows considerable movement of burden with practically no escaping gases.

To see how the ROCKMASTER Blasting System can improve your blasting efficiency and reduce noise at the same time, send for your copy of the booklet, "Overburden Blasting Techniques."

The North Jersey Quarry Company erected this greenhouse at its Millington operation, 400 feet from the working face, to prove that its blasts don't break windows. The reduced noise and vibration of the ROCKMASTER *system helps them improve community relations.*

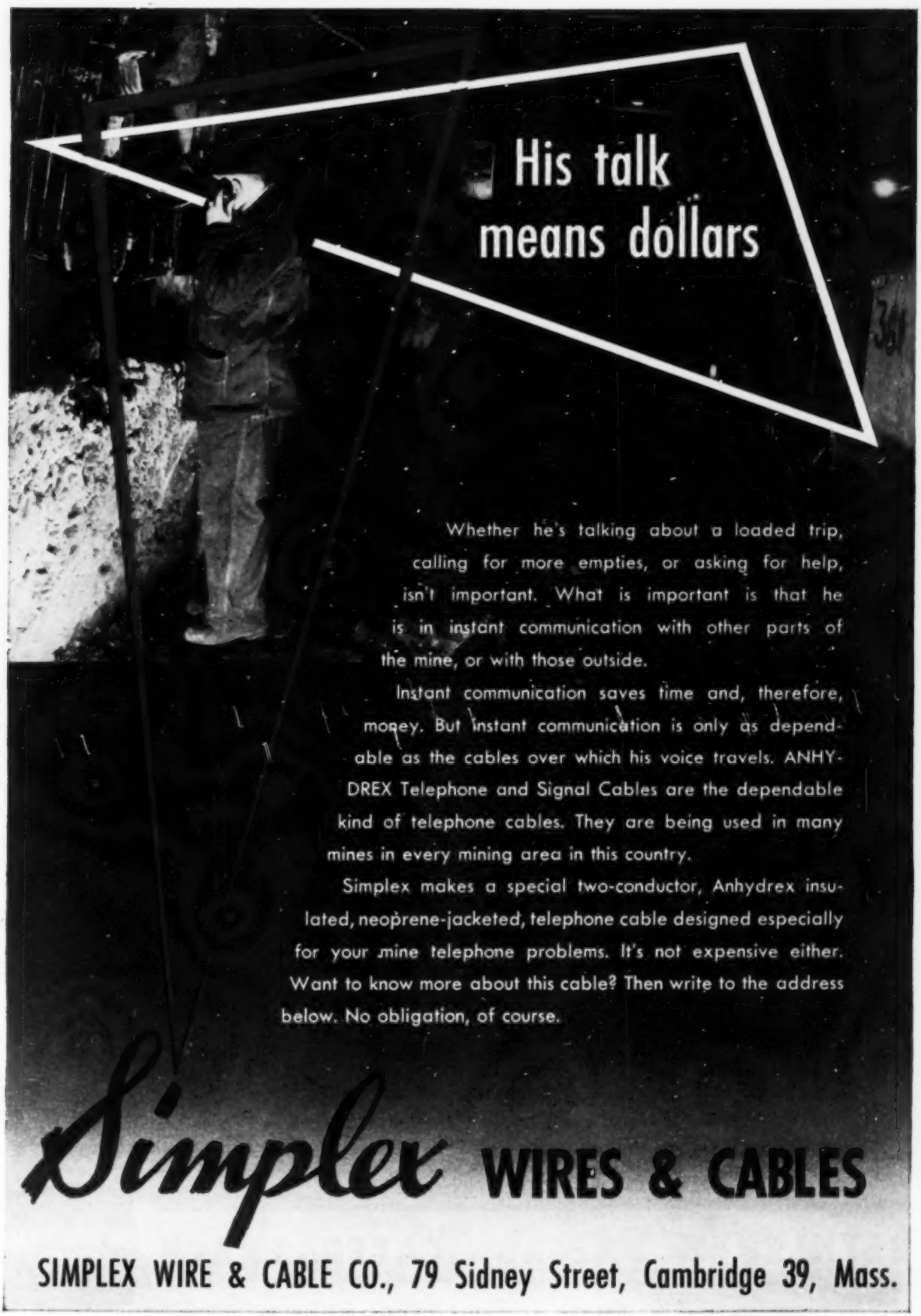
ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE

Offices in principal cities



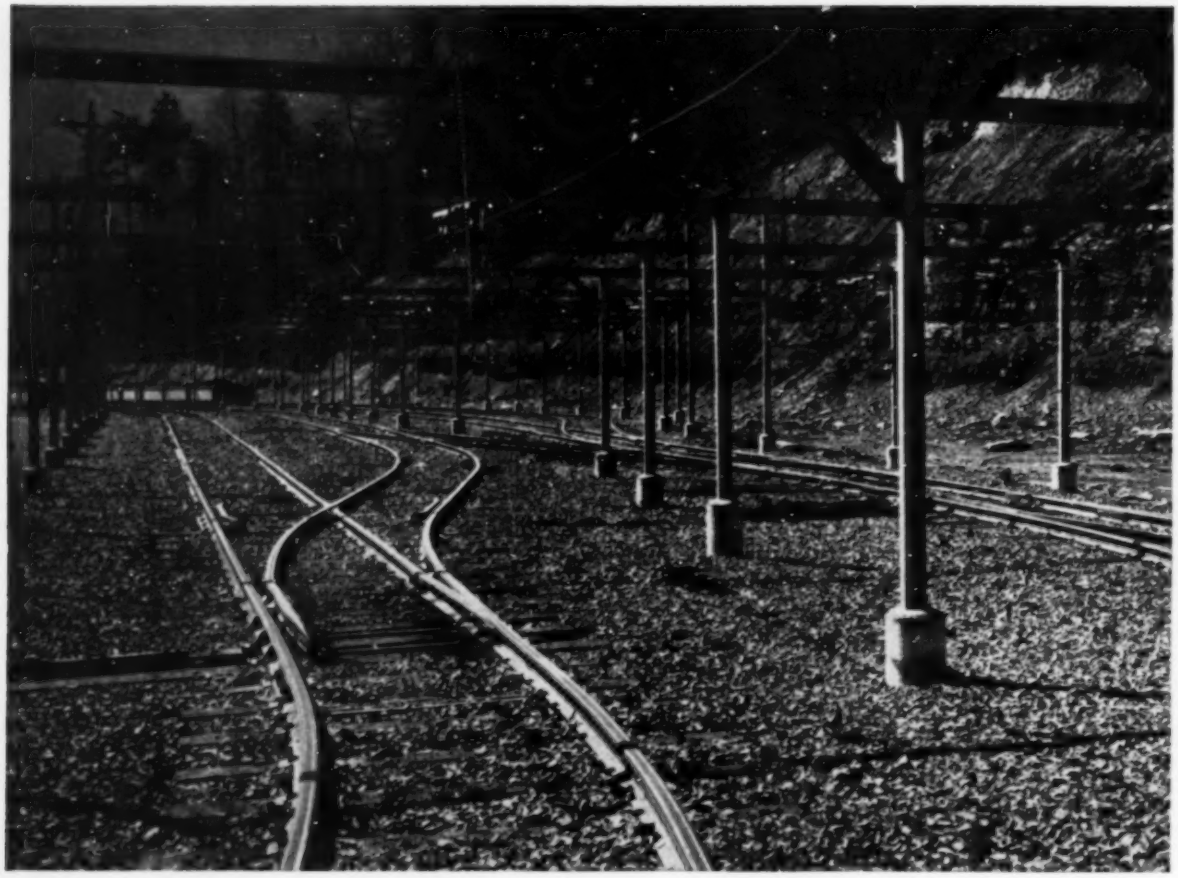
Whether he's talking about a loaded trip, calling for more empties, or asking for help, isn't important. What is important is that he is in instant communication with other parts of the mine, or with those outside.

Instant communication saves time and, therefore, money. But instant communication is only as dependable as the cables over which his voice travels. ANHYDREX Telephone and Signal Cables are the dependable kind of telephone cables. They are being used in many mines in every mining area in this country.

Simplex makes a special two-conductor, Anhydrex insulated, neoprene-jacketed, telephone cable designed especially for your mine telephone problems. It's not expensive either. Want to know more about this cable? Then write to the address below. No obligation, of course.

Simplex WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.



no jiggles, no bumps

no coal spillage here

Here is some typical Bethlehem prefabricated track. Even in the photograph, many of its features are readily apparent. Features like the well-aligned straightaways and perfectly-curved turnouts. But there's something else we'd like to point out.

That's the absence of coal along the track. See any spillage? There's hardly a chunk on the ground. None of those messy, dirty piles that so often litter the haulageways of many mines.

The loads are big, and the coal rides high. But it's still in the cars at the end of the trip—because the track is smooth, well made, well laid. Joints are trim and neat. Rails, both straight and curved, are free of ripples. Frogs are well machined, switch points carefully planed. There are no bumps, no jiggles, when trains run over this Bethlehem track. The coal stays where it belongs—in the cars.

It is now possible for any mine, regardless of size, to have equally good haulageways. If you are considering changes in yours, we suggest you consult with a Bethlehem engineer. He will be glad to study your mine and show you how Bethlehem prefabricated track can do a real job; how it can lead to smoother, faster, safer haulage.

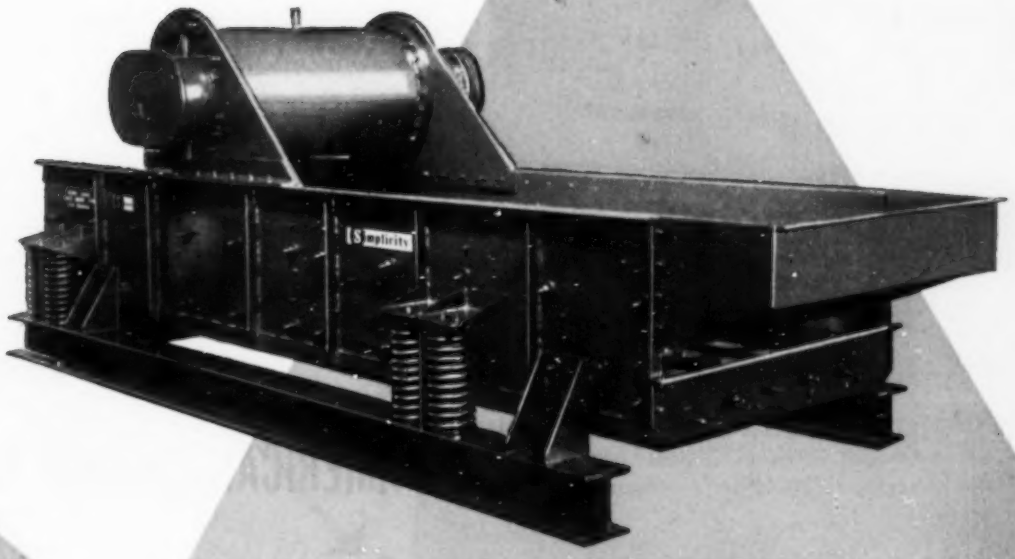
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM PREFABRICATED TRACK

BETHLEHEM STEEL

SIMPLICITY SCREENS
FOR BIG JOBS



AMERICA'S BIGGEST AND FASTEST
COAL DEWATERING AND SIZING SCREENS

120 SQUARE FEET SCREEN AREA

You get big screen quality and big screen performance when you put this big 6' x 20' **Simplicity** Double Deck Screen to work sizing, separating and dewatering coal in your mining operations. It's the largest horizontal screen ever built for handling coal, and it has been proved by years of trouble-free operation. Like other Simplicity Screens in use throughout the coal industry, it has the positive action and heavy, powerful construction that help keep daily production high and operating costs low. Simplicity builds scalpers, gyrating, horizontal and simpli-flo screens in several sizes for coarse scalping, sizing, separating and grading coal, dewatering fine coal sludge and dedusting coal in dry screening operations. Simplicity ball tray deck units are available for screening damp, sticky coal through small mesh screen cloth without build-up or blinding. For complete information, consult a Simplicity sales engineer or write us today.

138

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.

FOR CANADA: Canadian Bridge Engineering Co., Ltd. Walkerville, Ontario

FOR EXPORT: Brown & Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

Check *American* Quality—Feature by Feature—and you'll know

DESIGNED FOR REDUCING ROM LIGNITE to ¾" product. User reports this American AC-3-C Rolling Ring Crusher reduced over 200,000 tons—without a single repair or replacement!

WHY AMERICAN CRUSHERS can reduce coal for less than

per ton

AMERICAN Feature No. 5

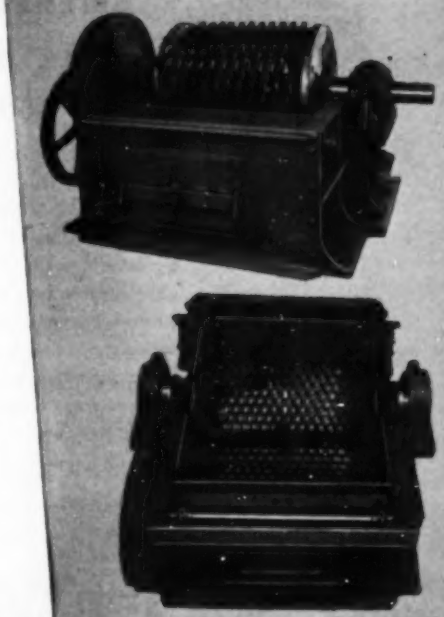
EVERY *American Crusher* IS... CUSTOM-BUILT TO MATCH A NEED

Mass production, in its usual meaning, does not exist in the American Pulverizer factory. *Every crusher is custom built* to perform according to your specific needs: the type of coal, size of feed, ROM or lump, reduction to be made, percentage of fines, tonnage per hour—all are important considerations translated into the design of each American Crusher.

To build a crusher exactly suited to your needs, American has developed many different crusher types—each available in a number of sizes, and each custom-designed to give you the proper crushing elements, screen plates and grate bars to provide correctly sized reduction in the quantity desired.

Performances in hundreds of mines, power plants and central stations conclusively prove Americans will crush coal *for less than 1¢ per ton* including depreciation, replacement parts, power and interest on original investment.

WRITE for Complete Literature.
Sales Representatives in Principal Cities.



American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE. • SAINT LOUIS 10, MO.

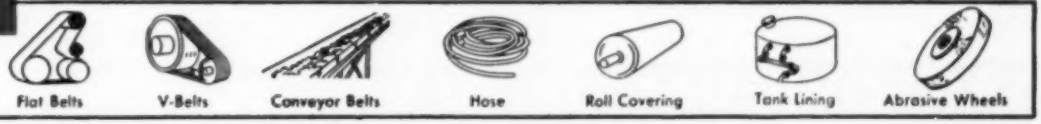
Ray-Man "F" Conveyor Belt—More use per dollar
Ray-Man "F" Conv e use per dollar
Ray-Man dollar
Ray-M per dollar
Ray-Man "F" Co e use per dollar

ON ABUSIVE HAULS... Ray-Man "F" will cut costs where your conveyor belts are commonly exposed to tearing or puncturing ... where pulleys are small ... where fastener failure is a particular problem. The unique properties of synthetic fiber strength members make possible these advantages. Ray-Man "F" also gives you everything you require in a general purpose belt—flexibility, troughability, impact resilience, ease of training, strong cover adhesion—MORE USE PER DOLLAR. Ask the R/M distributor for Bulletin 6915. Ask him, too, about Homocord, R/M's extra-cushioned conveyor belt for heavy impact loading. R/M field engineers back him up to give you MORE USE PER DOLLAR—not only in conveyor belts, but in hose, transmission and V-belts.

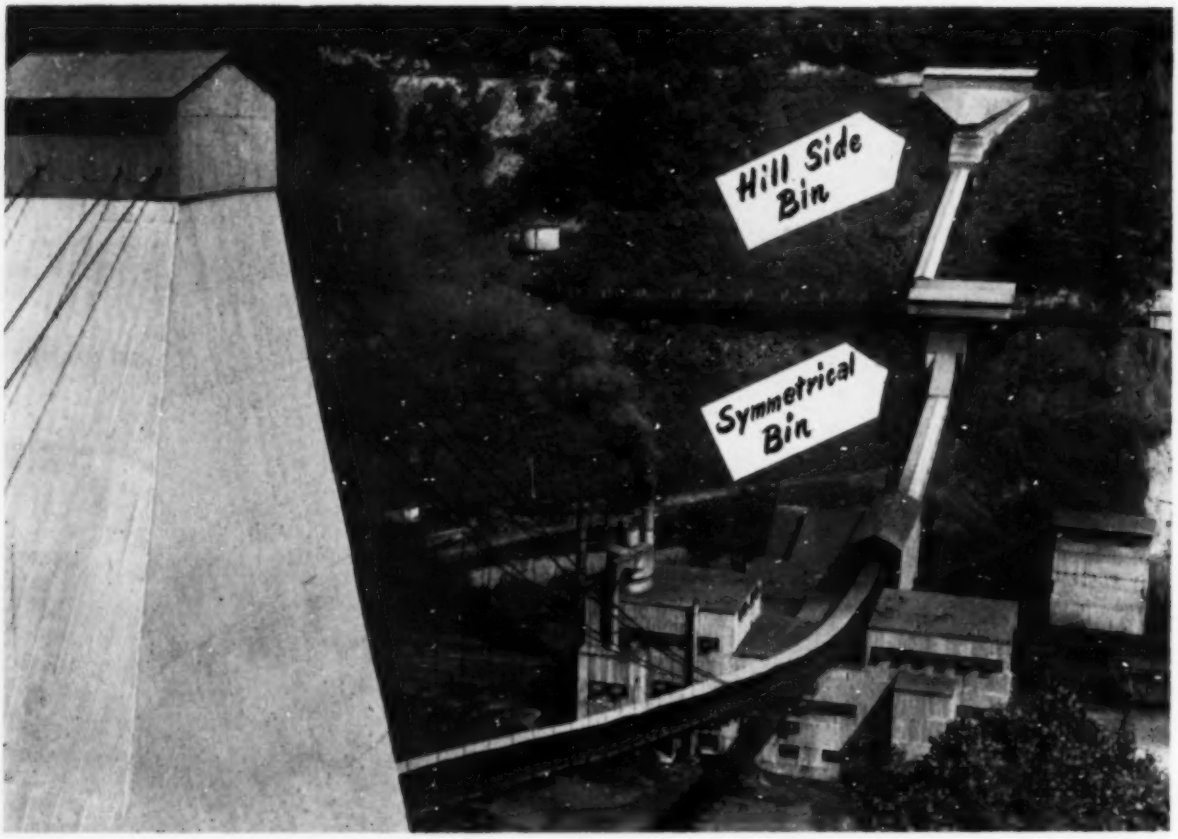
RM

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls



You just can't make it with old methods today . . . . .

It's an accepted fact today, proved by one change-over after another, that the S-D Automatic system of coal flow from mine to preparation plant is the only method that guarantees a balanced operation under complete cost control.

Continuous and balanced flow of coal from face to preparation plant depends on two factors. First, the speed and efficiency of S-D Automatic cars dumping on the move. Second, an adequate surge bin which serves as a temporary storage for coal in transit . . . a "fluid coupling" enabling coal mining and coal preparation to function independently of each other.

With an adequate surge bin and S-D Automatic cars, one shift operation of cleaning plant is often sufficient to take care of two shift operation of mine. Delays at the preparation plant need not stop mine production because the surge bin stores the coal. On the other hand, the bin continues to supply coal to preparation plant if a hold-up occurs at the face.

The photograph above shows the modern method of mining coal. In this case, however, three surge bins—a hillside bin and a symmetrical bin on one side of the gorge and another hillside bin on the opposite side, all served by S-D Automatic Cars, feed coal into one preparation plant.

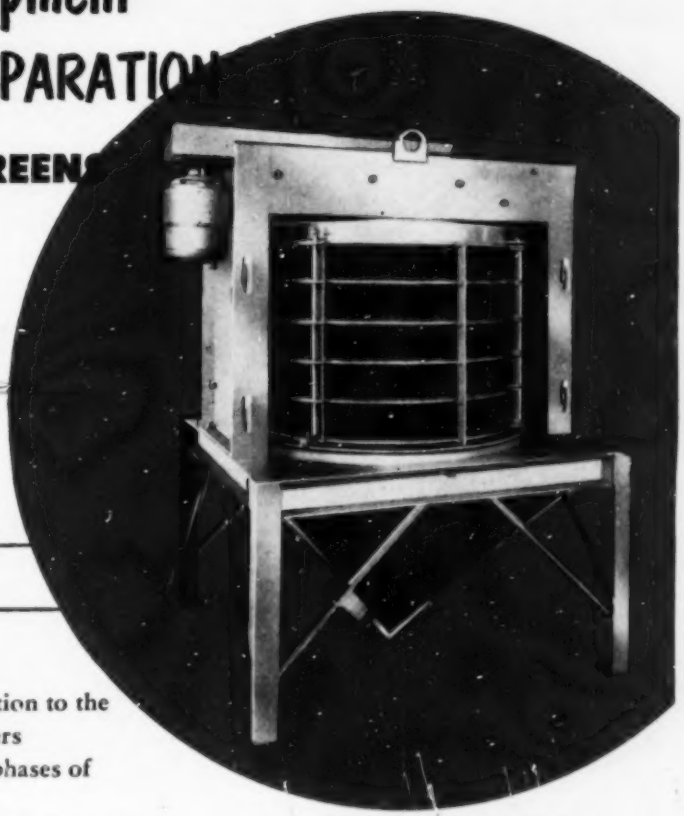
This, simply stated, is the S-D Automatic System for low cost coal production.

SANFORD-DAY IRON WORKS
KNOXVILLE TENNESSEE

Devoting Our Entire Capacity to the Building of Better Mine Cars for Over— 50 YEARS

A Proven New Development for BETTER COAL PREPARATION

. . . SYMONS "V" SCREENS



. . . for SIZING

. . . for DEDUSTING

. . . for DEWATERING

The Symons® "V" Screen, the newest addition to the well-known line of Symons screens . . . offers increased efficiency and economy in many phases of coal preparation service.

An entirely new screening principle gives the Symons "V" Screen unequalled high capacity for sharp, single cut, wet or dry separations, especially in the more difficult to screen finer sizes. The screening principle employs controlled diffused feed and vertical flow of material, with a low rotary speed and high speed gyratory action, combining centrifuge and gravitational force.

In dry screening, a natural fanning action carries the "air float" through with the undersize, making the handling of light weight materials extremely effective. In dewatering, the centrifugal action produces a much dryer product.

Requiring a minimum of floor space, the Symons "V" Screen is easily installed, and provides fully enclosed construction to assure dustless operation—yet access to the screen is simplified through easily removable covers. *Mail the coupon for further details.*

NORDBERG MFG. CO., Milwaukee, Wisconsin

OTHER SYMONS SCREENS

SYMONS HORIZONTAL SCREENS

SYMONS ROD DECK SCREENS

SYMONS BAR GRIZZLIES

SYMONS ROD GRIZZLIES

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.

S353

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO
MEXICO, D.F. • LONDON • JOHANNESBURG

MAIL THIS COUPON TODAY

NORDBERG MFG. CO., Milwaukee, Wisconsin CA
Please send me further information on the following screens for coal preparation service:

☐ Symons "V" Screens ☐ Symons Rod Deck Screens
☐ Symons Horizontal Screens ☐ Symons Grizzlies

Name ..... Title .....
Company .....
Address .....
City ..... Zone .... State .....

more and more MANITOWOCS on more and more stripping operations

Peter Kiewit & Son move in big MANITOWOC 4500 to strip Fortune Lake Development

Another big stripping job, and another big Manitowoc takes over. The Fortune Lake open pit mine, in Northern Michigan, owned by Pickands Mather & Co., is being stripped by veteran contractor Peter Kiewit & Son of Omaha, Nebraska.

Kiewit knows earth-moving and knows his equipment too. On the job went a 5 yd. Manitowoc Dragline to handle the difficult assignment. The Manitowoc 4500 had proved its mettle many times previously — proved its ability to lick tough jobs, profitably — so it was only natural to have a 4500 break ground.

Whether it's ore or coal, mining or stripping, you too will find a Manitowoc the most profitable investment you can possibly make. Included in the Manitowoc line are special hi-lift shovels, long reach draglines, designed for mining and stripping. May we send you complete information? Manitowoc Engineering Corporation, Manitowoc, Wisconsin.

MANITOWOC Speed Crane

SHOVELS · 1-5 YD. · CRANES · 18-100 TON

Here's versatile mining (and lubrication) in action!

● Coal is moved out fast when the continuous mining machine, shown above, goes into action in a midwest mine. This versatile machine literally chews coal from the face and loads it without preliminary cutting or shooting.

Here, too, is versatile lubrication in action. Two grades of SUPERLA Mine Lubricants (an oil and a grease) handle all of the major lubricant and hydraulic oil requirements of this large machine. Because these versatile products are fluid at low temperatures and resist thinning at machine-operating temperatures, they assure protective lubrication both when the machine is started cold and during long periods of continuous operation.

Transmissions and hydraulic systems have been kept clean and protected against wear. There have been no delays for warming up the machine. There has been no time wasted in applying the SUPERLA Mine Lubricants. The grease grade has poured readily from bung-type barrels and has been dispensed easily from hand-operated grease guns.

SUPERLA
REG. U. S. PAT. OFF.
Mine Lubricants

The Standard Oil lubrication specialist serving your section of the midwest can help you simplify lubrication and get better results through the use of SUPERLA Mine Lubricants. You can contact this man by phoning your local Standard Oil Company office. Or, write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

H. Dillingham, of Standard Oil's Evansville, Indiana, office, has helped this midwest mine gain an important versatility in their lubrication. Practically all of this mine's underground lubrication is handled by two grades of SUPERLA Mine Lubricants.

H. Dillingham is one of a corps of Standard Oil lubrication specialists located throughout the Midwest. These men are specially trained and have a wealth of practical experience to help you with your industrial or mining lubrication problems. One of these men is near your mine. You can reach him easily and quickly by phoning your local Standard Oil Company office. At no obligation to you, the Standard specialist will be glad to discuss savings that you can make with SUPERLA Mine Lubricants and such outstanding products as:

STANOIL Industrial Oils...Here's *one* line of oils that provides cleaner operation of loader and crane hydraulic units; supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants... On open gears and wire ropes, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

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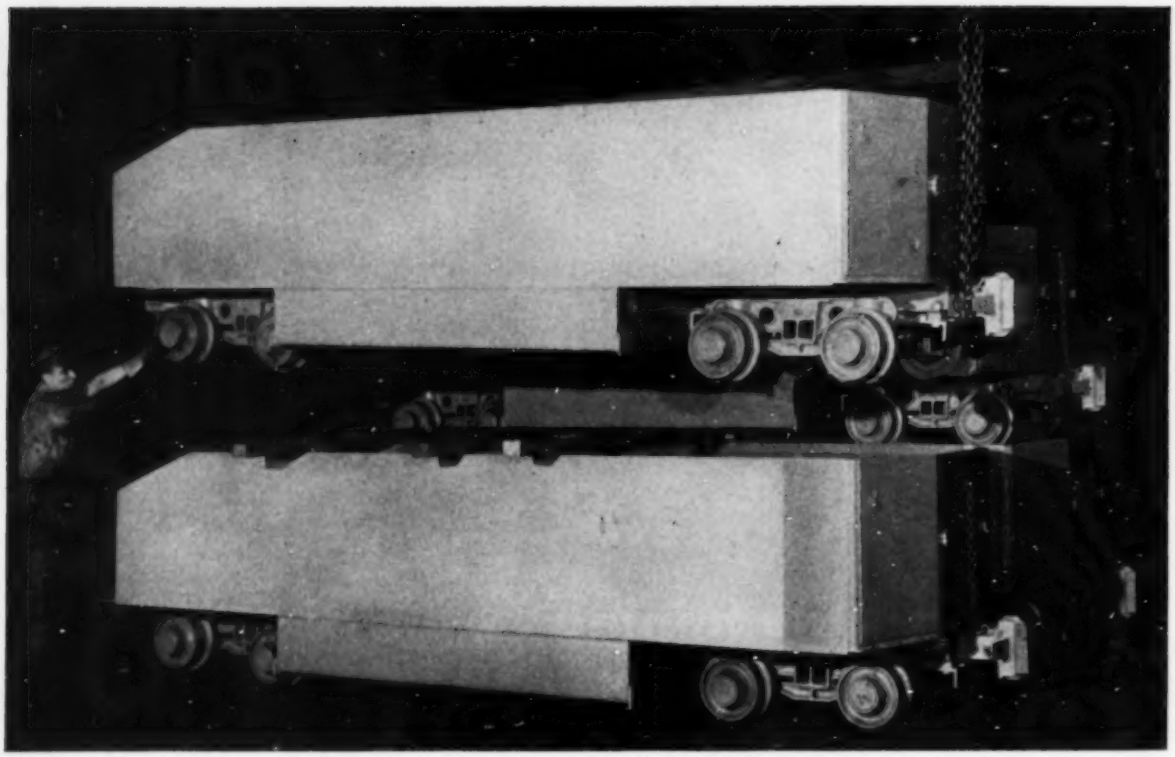

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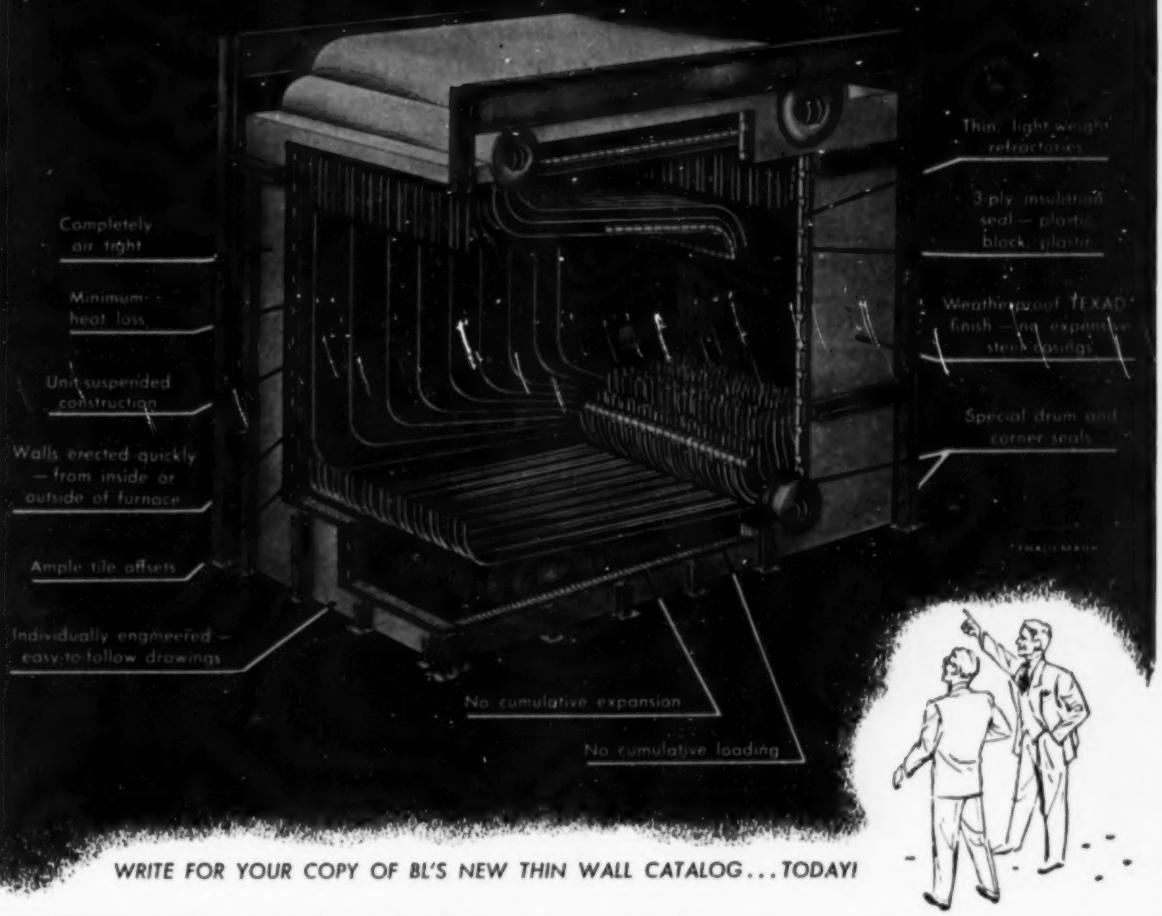
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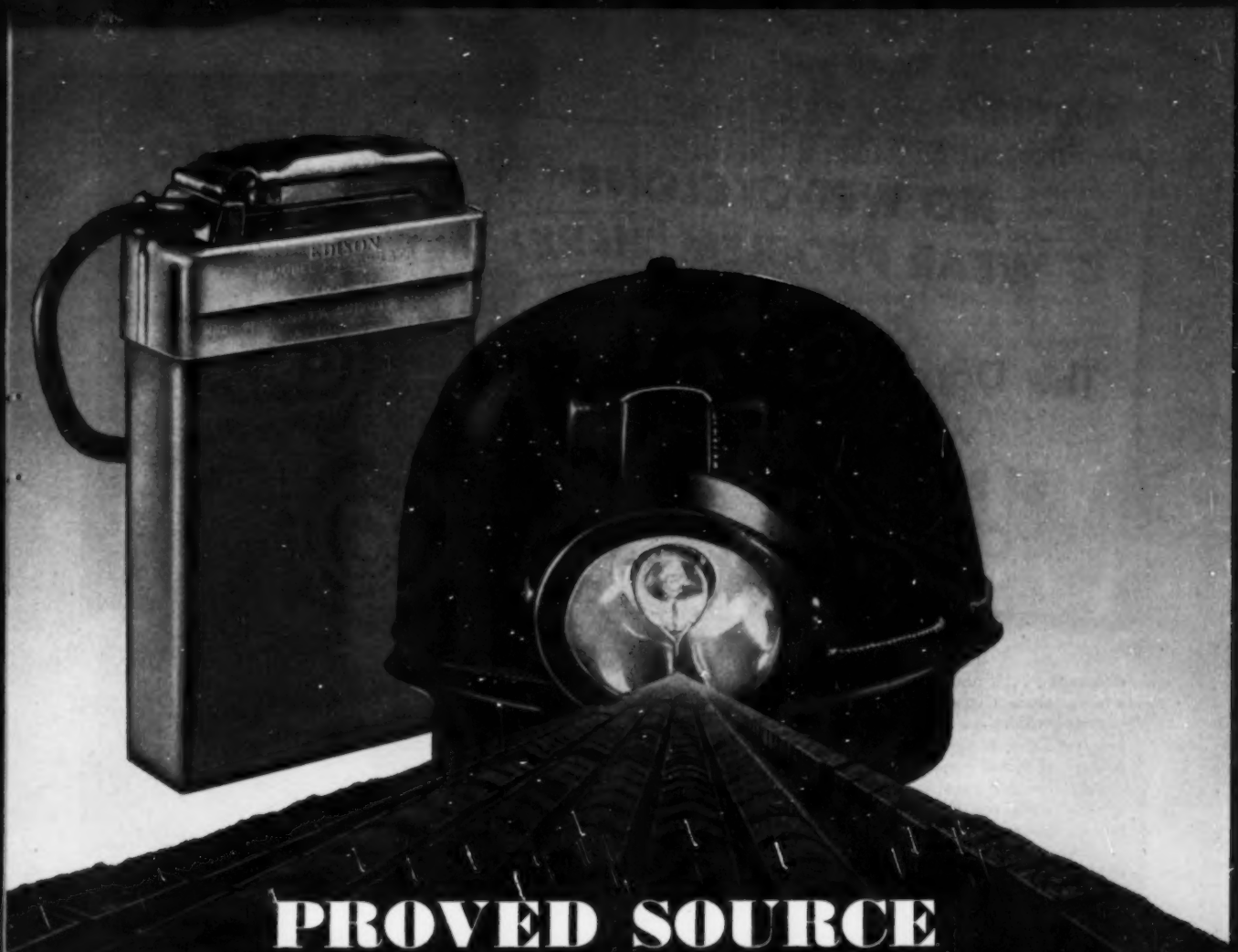

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***Here are the facts . . .**

LOCATION: Robena Mine of United States Steel Corporation's Coal Division.

EQUIPMENT: 6" dia. DorrClone equipped with Type CB liner.

DURATION OF TEST: A total of 896 operating hours between February 3 and April 15, 1953, when the unit was taken off the line for exhibit at the Coal Show in Cleveland.

FEED TO DORRCLONE: Overflow from hydraulic classifier

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Screen Analysis:	20% + 35 mesh
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WEAR RESULTS:

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says **INGALLS SHIPBUILDING COMPANY,**
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At this vast shipyard, Ingalls has 1200 welding machines, and 1000 welders to man them. The Amerclad Welding Cable is run at top amperage 16 to 24 hours a day. It is dragged over razor-edged steel scrap and battered under heavy loads. It comes into contact with fresh welds while they are still red hot, and it is constantly showered with flaming slag from the burners' torches.

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This great shipyard uses 60,000 feet of welding cable a year. But whether you use 60,000 feet or 600; whether you need a rugged cable for welding machines, power shovels or electric hand drills—there's a tough Amerclad design to give you the very best service life.

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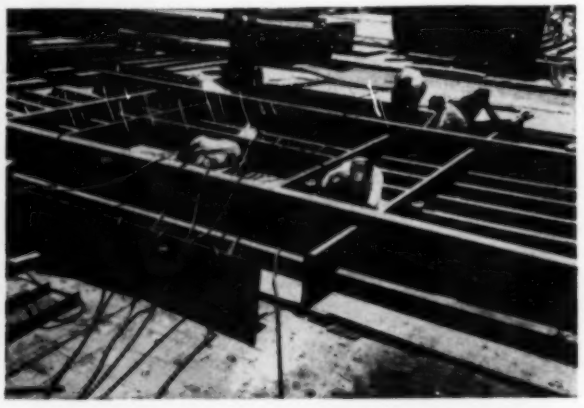
Ingalls uses lots of Amerclad for portable power tools. Here, it powers a half-inch electric drill used to bore 6-inch shoring timbers.



This is a typical shipyard operating condition. The cable is exposed to all kinds of weather, and dragged over sharp steel plates and beams.

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

OCTOBER, 1953

IVAN A. GIVEN, EDITOR

Paying Step

"TRAINING" is a more and more familiar word in coal mining. This reflects the fact that more of it is being done—in safety, labor relations, maintenance, cost cutting and other phases of mining. Does training pay? The answer is that it certainly does. In fact—at least in certain fields—there is concrete evidence that it does. Take accident-prevention training. Over 20 mines in eastern Kentucky and Virginia have provided this course for all employees. All have benefited by sharp reductions in injuries.

Training of course can involve formal classwork with lectures, demonstrations, homework and recitals. Or it can take other forms, such as a group sitting down and discussing things. But whatever its form, training has this most-valuable result: it results in an analysis of the problem and, as a natural consequence, leads to a solution. The basic step is getting a problem before a group, whether supervisors, managers, or men, in one way or another. When they begin to think about it, either by themselves or with the help of leaders or experts, the answer begins to come out. Then is when training begins to pay off.

Sensible Course

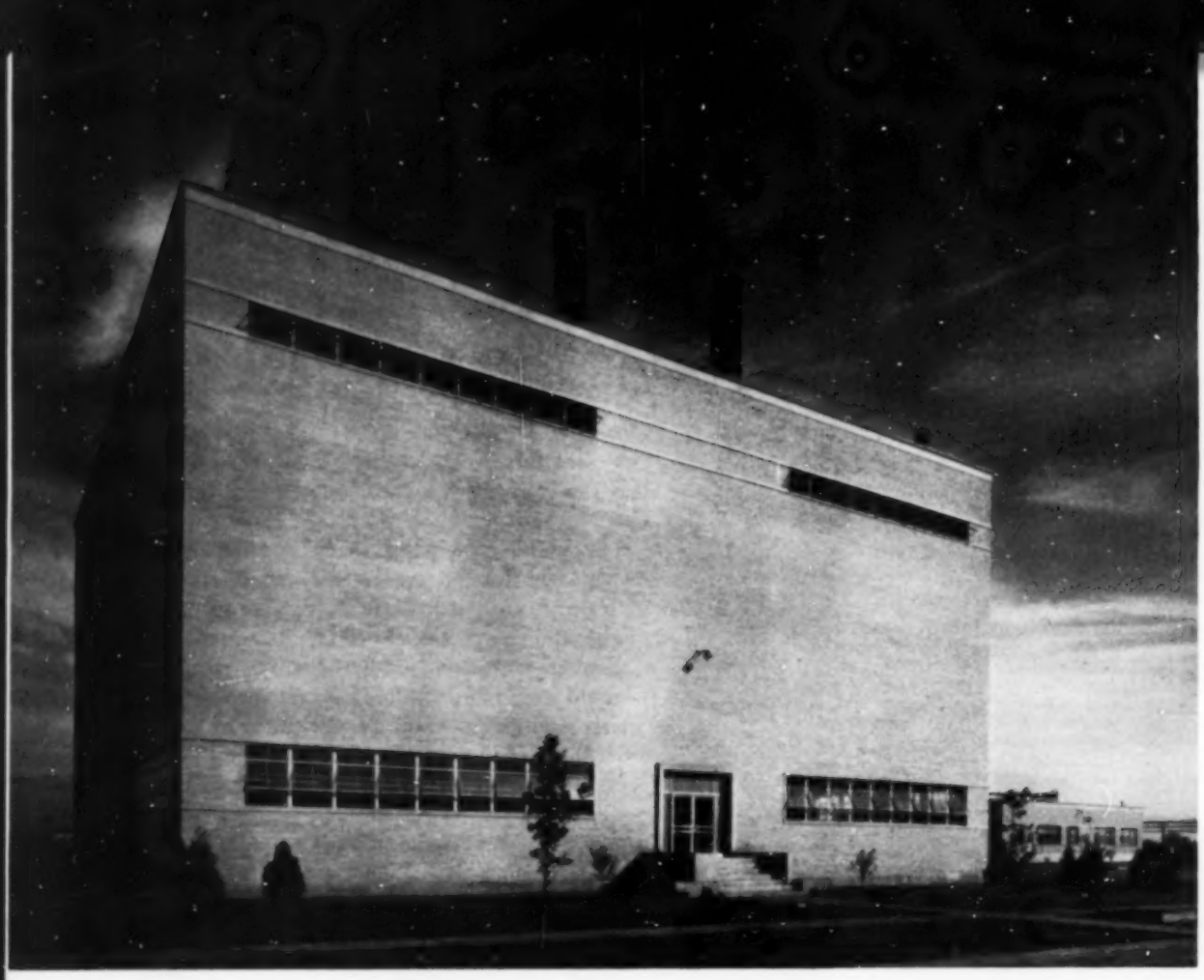
ARE THE RAILROADS—with perhaps one notable exception—writing themselves into a hole in writing off their steam locomotives? Even though its sales to railroads are sharply off and are still declining, coal still has an important stake in the business and should continue to work to persuade the railroads to reconsider their present course, especially since it has gotten to the point that several carriers have not a single steam locomotive left. As a result, they are now committed to a single, specific type of fuel—and a rather special one at that.

This brings up some questions. In case of an emergency or, frankly, war, how about supplies of this special fuel when many claimants will be clamoring for preference and refineries may be pressed to convert to jet fuels, aviation gasoline and other military products? The railroads could have a rough time—and with them, the country. It would seem more sensible for the railroads to do at least two things—continue efficient steam units and devote part of their funds for new locomotives to the purchase of modern coal-fired equipment. They would be well served with these coal-fired units and they would not be running the risk of a fuel shortage at the time they would need it most.

No Change

IN THE PIPING NEW DEAL DAYS, it was observed on this page that the government was generally proceeding as if it intended to wrap every drop of water in concrete and make it produce power regardless of cost. Along with this, the government was doing its best, with little regard for whether the means were fair or foul, to muscle everybody else out when it went in, all in the name of the farmer, the cooperative and "all the people." Thus, the present power policy of the Bureau of Reclamation is of more than casual interest, particularly to coal producers who were prime, although not specified, targets of the federal hydro advocates.

The new statement of policy was announced by the Department of the Interior in August as "simple and fair to all." However, a careful reading, with especial note of the numerous references to New Deal laws, leads to the conclusion that the Bureau of Reclamation still intends to take full advantage of these laws. Thus, policy differs not in fundamentals but only in degree. Therefore, coal must still be prepared to raise its voice against further projects that not only would limit markets but would also be uneconomic and a burden on the taxpayers.



MODERN COAL PLANT provides unfailing low-cost steam for Upjohn, makers of penicillin, cortisone and other drugs. It's one of many plants across the Nation classed among . . .

"Other Industrials"...

How coal has fared
What its opportunities are

"MYSTERY MARKET" is perhaps one way of describing the "Other Industrials" group of bituminous-coal consumers. The mystery lies not in the fact that this market represents a large chunk of the bituminous business—and also a market that can be cultivated and enlarged with profit to all. Instead, the mystery lies in exactly what the "Other Industrials" market is and how it has been faring in recent years.

"Other Industrials" is the catch-all column of coal consumption set up by the Bureau of Mines alongside other columns that show coal use by utilities, Class I railroads, steel and rolling mills, coke plants, cement mills, ships' bunkers and retail-dealer deliveries. The "Other Industrials" column, based on annual spot checks, estimates the total coal burn of such varied industries as food, pulp and paper, textiles, chemicals, Classes II and III railroads and a miscellany of others, all of which burn small tonnages individually but a big quantity in the aggregate. This column also includes whatever tonnage figure may be needed to bring total consumption in all columns up to a sense-making figure.

Most plants and operations represented in "Other Industrials" grew during World War II and, since then, have expanded even more rapidly. But few facts are known about fuel trends in this group. One trouble is that government statistics, in many

Today, process-steam and industrial heating plants burn big quantities of coal. Improved service, better equipment and current market data can put coal in more of these plants.

instances gathered only at 10-yr intervals, lag behind current developments. Another trouble is that some plant managers don't like to turn loose data on their plant operations. A third obstacle to collecting the full facts is that coal producers seldom can learn what happens to the substantial tonnages they sell to brokers.

Compared to the average of 107,495,000 tons for the 5-yr period 1935-39, consumption by "Other Industrials" in 1952, according to preliminary data from the Bureau of Mines, was 95,863,000 tons, or approximately 11% less. This situation developed in the face of a major expansion in the Nation's industrial machine. Part of the answer, of course, is found in increasing use of oil and natural gas both in old plants and in new installations. But there are at least two other reasons for the decline:

1. Increased efficiency in the use of coal as a result of higher quality, modernization of existing plants and a sizable increase in the number of new, modern and efficient coal-burning units.

2. Transfer of power loads from private electric plants to the utilities. Actual figures are impossible to obtain but the rapid growth in the production of electricity in recent years is, at least in part, an indication that the switching has taken place and is continuing. Spot checks with utility managers and with coal-company sales officials bear this out and indicate that a fairly large tonnage formerly found in the "Other Industrials" column now appears in the totals for "Electric Utilities."

Thus the loss in "Other Industrials" is, to some extent, more apparent than real. As a matter of fact, available evidence suggests that in "Other Industrials" coal has a solid core of customer preference that means real business today. In addition, it provides the basis on which to build a bigger business in the future.

The keys to full development of the "Other Industrials" market include the following:

1. Expansion in engineering services for both present and potential customers.

2. Improved coal-burning and ash-handling equipment—well promoted, manufactured in quantity and sold aggressively.

3. Better statistics to pinpoint market trends and opportunities.

What Makes Up the Market

Take another look at the Bureau's estimate of coal use by "Other Industrials" in 1952. The figure is 95,863,000 tons—a sizable tonnage.

The 1952 figure can't be broken down industry by industry. But a breakdown of the corresponding figure for 1947 is available from the Department of Commerce Census of Manufactures. In that year, five industries used about 50% of the bituminous that went into the "Other Industrials" column. Those five were food manufacturing, textile-mill products, paper and allied products, chemicals and allied products, and stone, clay and glass products. Table I shows how 1947 coal use by those five industries increased over the 1935-39 average. The rise in total consumption by the five industries was 43%, with chemicals leading the pack with an 83% increase, closely followed by paper and the stone-clay-glass group, with increases of 46.8 and 35% respectively—and so on down the line.

Today, the pattern probably is little different from what it was in 1947, though it may be expected that the actual figures have changed. Here, then, within five industries, lies some 50% of total coal consumption by "Other Industries." These same five industries are of the type that responds quickly to growth in population, consumer-goods demand and home and industrial construction. Within them, in this period of our Nation's greatest growth, lies the potential for a substantial increase in coal consumption if the coal industry grasps its opportunities.

How well is coal doing with these opportunities?

Pretty well, it seems, though there's room for improvement and though obstacles have been tough to overcome.

By no means all of the new plants built since World War II have fallen for the so-called "package" unit promoted by the oil and gas industries. These units, ready to be skidded into place and hooked up, often fall short of their promise of automatic laborless operation, minimum maintenance and top efficiency. For that reason, as well as for other reasons, coal still is going into a substantial number of new privately-owned steam and power plants.

Figures on the construction of new privately-owned steam and power plants in 1951 have been gathered by *Power* magazine. Those figures show that among the 663 smallest plants built in 1951, producing 29,000 lb of steam per hour and under, coal was selected as the fuel for 27.5%—a considerably higher figure than oil and gas propaganda would suggest. In the next size range, plants producing from 30,000 to 49,000 lb of steam per hour, coal was selected for 43.5% of the 161 new plants surveyed. Out of 176 new plants in the 50,000- to 100,000-lb class, 48% turned to coal. And in the largest new plants, producing over 100,000 lb of steam per hour, coal went into 52.5% of the total of 159 built.

Thus, coal is far from beaten in the contest to provide fuel for privately-owned steam and electric plants, though its record, particularly in the small-plant group, leaves something to be desired. Nevertheless, coal still holds a big share of the market and, as the word gets around among power-plant engineers about economy and trouble-free operation with solid fuel, coal can reasonably expect a still stronger swing in its direction.

Getting More From Coal

The word about coal as the best fuel will get around as engineering design and fuel practices improve and as coal, by concerted action, promotes the idea of modernizing steam-plant construction and equipment. Among the agencies engaged in spreading this doctrine are the Fairmont Coal Bureau and Appalachian Coals, Inc. Their efforts are supplemented by

TABLE I—How Coal Use Grew in Five Industries, Prewar to 1947

	Coal Use (Million Tons) Average, 1935-39	1947	Per Cent Increase
Food manufacturing	10.6	12.5	18.2
Textile-mill products	5.5	5.9	7.5
Paper and allied products	9.2	13.5	46.8
Chemicals and allied products	8.7	17.7	83
Stone, clay and glass products	12.2	16.6	35

Source: Census of Manufactures, 1947.

some individual coal companies that provide engineering services for their customers while, over all, the National Coal Association is actively plugging the benefits of coal in its advertising.

Examples of the help that wins and holds customers for coal appear in current NCA advertisements and in a booklet titled "Burning Bituminous Coal the Modern Way," recently issued by Bituminous Coal Institute. Here are a few of the case histories NCA and BCI are publicizing in various ways:

Bernheim Distilling Co., Louisville, Ky.—Replaced six old boilers with three new ones and added automatic combustion controls. RESULTS: More steam than with old boilers and virtually smokeless operation; operating-cost savings, $67,000 per year.

Jeffrey Mfg. Co., Columbus, Ohio—In 1949, built a new boiler house and replaced six old 350-hp boilers with three 60,000-lb-per-hour boilers; also installed automatic controls and up-to-date coal- and ash-handling equipment. RESULTS: Steam cost reduced from 59.8 to 48c per 1,000 lb; annual savings in operating labor, $21,400; saving in coal-handling cost, $6,613; saving in coal, 4,271 tons (annual use, 17,000 tons).

Allen Memorial Hospital, Waterloo, Iowa—In 1952, replaced old equipment with two new 125-hp boilers, two pneumatic spreader stokers, coal- and ash-handling equipment and automatic controls. RESULTS: Steam costs cut 18c per 1,000 lb; labor savings, $960 per year; operating costs cut 23% with 50% expansion; coal saved, 108 tons per year (annual use, 980 tons).

Chicago & Eastern Illinois R. R., Danville, Ill.—Replaced old handfired equipment with three 521-hp boilers, three spreader stokers and coal- and ash-handling equipment. RESULTS: Operating man-hours per week reduced from 112 to 59; fuel cost reduced 45%; fuel consumption cut 20.3% (monthly fuel use, 1,425 tons).

Worumbo Mfg. Co., Lisbon Falls, Me.—In 1946, replaced handfired equipment with two 25,000-lb boilers, four spreader stokers, automatic controls and coal-and ash-handling equipment. RESULTS: Savings of 30c per 1,000 lb of steam; labor costs reduced 60%; coal tonnage reduced 21% (monthly coal use, 550 tons).

Kerr Bleaching & Finishing Works, Concord, N. C.—In 1950, replaced nine scattered boilers and some old stokers with one 60,000-lb boiler and one spreader stoker, added automatic controls and coal- and ash-handling equipment. RESULTS: One boiler now doing the job that nine formerly did; labor reduced 67%; tonnage reduced 30% (annual coal use, 13,800 tons).

Thomas Young Orchids, Inc., Bound Brook, N. J.—In 1950, discarded 13 low-pressure firetube boilers and installed three new 20,000-lb watertube boilers, three link-grate stokers, coal- and ash-handling equipment and automatic controls. RESULTS: Labor saving, $6,000 per year; fuel-cost reduction, $8,000 per year (annual coal use, 2,500 tons).

Bethany College, Bethany, W. Va.—In 1949, discarded old chain-grate stoker and installed a new boiler with spreader stoker and automatic controls. RESULTS: Reduction of annual coal needs from 2,600 to 1,650 tons.

Perfection Stove Co., Cleveland, Ohio—In 1948, scrapped antiquated building and equipment and installed three new 600-hp boilers, three underfeed stokers, coal- and ash-handling equipment and automatic controls. RESULTS: Steam output per dollar increased from 1,362 to 2,378 lb; heating capacity multiplied six times with only 50% increase in coal consumption.

What do these case histories show? They show, primarily, that there are vast areas for improvement in the efficiency with which coal usually is burned in industrial plants and that coal customers can be won and held by engineering services and modern equipment. They show also that coal men should be gratified, not disappointed, if coal consumption by "Other Industrials" fails to grow as fast as food, textile, chemical and other industries grow. The reason coal use may not grow as fast is that coal users are getting more useful Btu's from their coal.

Buying Utility Power

As pointed out earlier, figures on consumption of coal by "Other Industrials" are not a true index of the use of solid-fuel energy by this group, because more and more industrial plants are drawing their power from the electric utilities. That means, as already stated, that at least some of the coal formerly burned under privately-owned boilers now is being burned under utility boilers.

In fact, according to the grapevine, there are areas, especially in the Southeast, where electric utilities since the war have bought worn-out privately-owned power plants and then abandoned them to rust, writing them off to depreciation and tying the customer onto the highline, with contentment for everybody concerned.

Naturally, the switch from private to utility power isn't always practicable. As a vice president for sales of a large utility system in the East explains, no wise utility management would try to sell every plant within reach of the highline. Sales to industry, he points out, must fit the system's load pattern and capacity. Besides, if a plant needs steam for processing and can balance steam and power demands, the plant can generate its own electricity at fairly low cost and bleed steam off the turbines at lower pressure for processing.

Even so, the trend to utility power is strong among industrial plants. The trend comes clear in a comparison of

the growth of utility systems with that of industrial generating plants. In 1939, installed generating capacity of industrial plants was 10,575,400 kw; in 1952, 15,063,100 kw, up 42.4% from 1939. But utility capacity grew much faster: from 38,862,716 kw in 1939 to 82,117,283 kw in 1952, up 111.3%.

Look also at actual power output. In 1939, industrial plants generated 33,667 million kw-hr; in 1952, 63,666 million, up 89.1%. But the utilities' growth was far greater: from 127,641 million kw-hr in 1939 to 398,924 million in 1952, up 212.5%.

To be sure, the increasing domestic load accounts for much of the growth in utility capacity and output. But power purchased by "Other Industrials" accounts for some share of that growth and, in turn, for some part of the utilities' growing coal burn.

One recent development, typical in trend if not in magnitude, highlights the transfer of electric load from industrial generating plants to utility lines. In the Greater Philadelphia-Delaware-South Jersey area, 131 new industries varying widely in sizes and types were established from 1949 through Jan. 1, 1952. Since 1946, Philadelphia Electric Co., which serves only a part of this region, has increased revenues 78% from industrial and commercial customers. In other words, rather than build their own plants to generate power, a good many companies are buying power from the utility.

Building the Market

As pointed out earlier, there's still plenty of room for coal to grow in the industrial steam-and-power market.

How can coal make the most of its opportunities to grow?

Some time ago, the Fairmont Coal Bureau reported as follows:

"Experience has taught us that inconvenience, inefficient combustion and excessive labor costs in the industrial steam plant represent the combination of factors that have lost more coal customers than all of the coal-cost increases, strikes and other vagaries of the industry combined."

Many plant failures, Fairmont says, are illogically associated with coal or mistakenly attributed to coal. These failures should not be charged to coal but to one or more of the following:

1. Failure to design plants as integrated units.
2. Lack of basic facts on various coals and their availability.
3. Eagerness to by-pass consulting engineers and thus save fees that would pay good returns in efficiency and savings.
4. Destructive competitive bidding among equipment makers, egged on by the equipment purchaser.
5. Improper selection of equipment.
6. Failure to coordinate boiler, furnace, and stoker or pulverizer.
7. Division of responsibility among plant owners, plant operators and fuel purchasers.
8. Manufacturer's over-rating of equipment.
9. Operator's overloading of equipment.
10. Unwillingness to change building structure to fit modern needs.

If the above is the negative side of the coin, the affirmative side should show how to hold present customers, especially those who need steam for heat and processing rather than for electric power, and win a fair share of new plants for coal.

Fairmont, helpful on this side of the coin also, holds out the following considerations for new-plant construction, and plant modernization:

1. High performance efficiency, produced by burning good coal in modern equipment.
2. Cleanliness.
3. Minimum labor costs.
4. Low capital costs, made possible by standardized design for boilers and stokers.
5. Low maintenance costs.
6. Good equipment for handling coal and ashes.
7. Oversize screw conveyors, coal gates and chute openings and anti-segregation stoker hoppers.
8. Combustion controls and instruments.
9. Elimination of those weaknesses in equipment, design and fuel selection that have caused dissatisfaction.

Can these goals be achieved?

The answer is "Yes."

They can be achieved by strengthening such agencies as the Fairmont Coal Bureau and Appalachian Coals, Inc., both of which offer skilled engineering services to small and big plants. Both agencies are working with limited means. To make their efforts more effective, they need more generous support from present members and new support from more producers in the areas whose coals they represent. With enlarged support, they can broaden their services, reach more industrial plants and spread their doctrine more effectively among constructors, architects, consultants and engineers. Guided by the success of these two agencies, coal men in other mining regions can shape similar agencies that will make coal an inviting fuel for industrial plants elsewhere.

Another possible step toward the achievement of these goals lies in organizing, capitalizing and operating an industry-owned equipment and service organization (*Coal Age*, July, 1953, pp 65, 128). Such an outfit would design, test, manufacture, promote and sell industrial as well as domestic burning equipment, coal- and ash-handling equipment and controls and instruments. Anthracite already is moving in that direction. The most effective pattern for bituminous doubtless would differ in some respects but the basic aim would be the same—to swing more fuel users to coal by ensuring the availability of equipment that will put coal out front in the competitive-fuels race.

A final assist in reaching the goals would be better statistics to show what's going on in the industrial-fuels market. As stated earlier, government statistics often lag far behind current trends, producers seldom know where their coal goes after delivery to a broker, and much of the tonnage delivered to retail yards, and so classified by the Bureau of Mines, actually ends up under commercial and industrial boilers. The upshot: Analysis of events among "Other Industrials" must be based, at least partly, on inference and speculation.

For concerted action by coal producers, concerted up-to-date statistics are needed. The answer might be a central industry-supported statistical bureau—or an enlargement of the functions of existing bureaus—to collect the needed figures and correlate them. With statistics that pinpoint developing trends, producers as well as coal's sales and engineering services can move fast when action is indicated.

Reaching the goals will cost money—but not as much money as might be lost in a shrinking market. And it will take some selling. But, helped by better equipment, broader engineering services and current statistics, hard selling will bring rewards, for coal then will move to markets that will welcome it.

The goals are worth striving for, and they can be reached.

BOLTING BENEFITS at Bethlehem's Mine No. 44 include ability to take tight corners with confidence. There is no danger from close timbers and haulage speed is fast.

Better Bolting . . . Greater Safety . . . Better Mining

SELF-PROPELLED CAR hauls bolting equipment from place to place. A short length of hose connects stopers to 1¼-in airlines immediately outby the face.

Successful Roof-Bolting at Idamay

How 138.42 mi of entry were bolted with no major failures. What the benefits are and how they are achieved.

By A. E. FLOWERS
Associate Editor, Coal Age

BETTER ROOF CONTROL, elimination of accidents from handling or dislodging timbers, and recovery of 7 to 10% more coal in pillar extraction are top benefits credited to roof-bolting at Mine No. 44 of the Bethlehem Mines Corp., Idamay, W. Va. Successful bolting of 138.42 mi of entry with no major failures in development work is the result of over 5 yr of progress in methods and materials at Idamay. One of the pioneers in roof-bolting in coal mining, Bethlehem adopted this type of support shortly after rehabilitation work was completed at Idamay in 1948, following purchase of the property from the Consolidation Coal Co. in 1943.

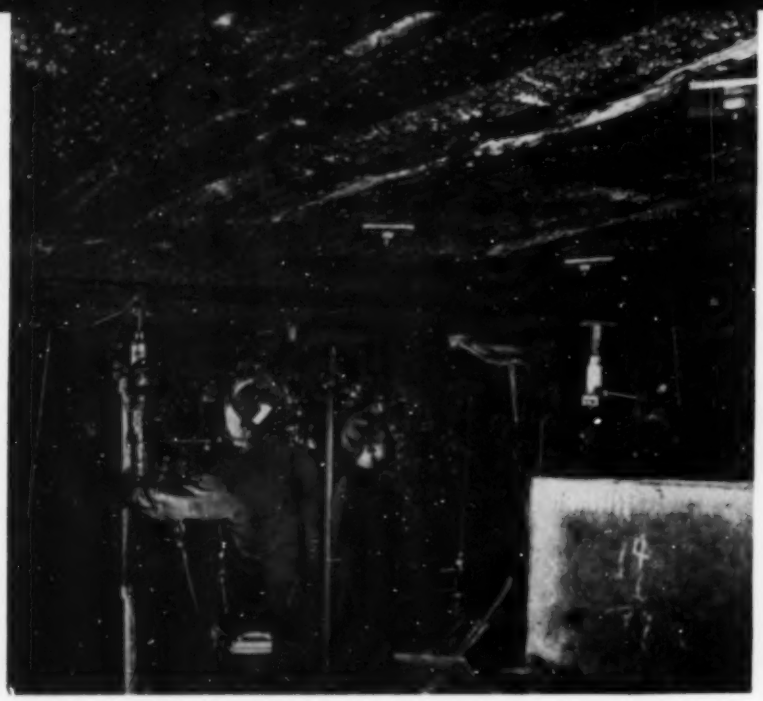
Idamay, presently producing 8,100 tons of coal per day, was opened by the Consolidation Coal Co. in 1916 and produced until 1925. In 1943, Bethlehem purchased it and began making plans to dewater and rehabilitate the mine. A major problem, along with the regular problems encountered in re-opening a mine, was cleanup and retimbering of entries. Large quantities of rock had to be loaded out and heavy, expensive steel timbering was required along the main haulage roads.

The Pittsburgh seam lies about 500 ft below the surface at Idamay and has an average thickness of 92 in. Immediately over the coal is an average of 12 in of drawslate which in turn is overlain by 12 in of wild coal. The main roof is a laminated shale that distintegrates when exposed to air. Current practice is to mine 84 in of the coal, leaving 8 in of top coal to prevent air-slacking of the drawslate. This practice, along with roof-bolting, has practically eliminated cleanup work in aircourses and in pillar work.

Main-haulage timber standards, set up soon after rehabilitation work began, called for installation of 13-ft Bethlehem 8-in H-beams on 5-ft centers. These were supported on 8x8-in hardwood legs and the space between beams was lined with 2- and 3-in oak planking and cribbed to the roof. In some small areas the roof was gunited.

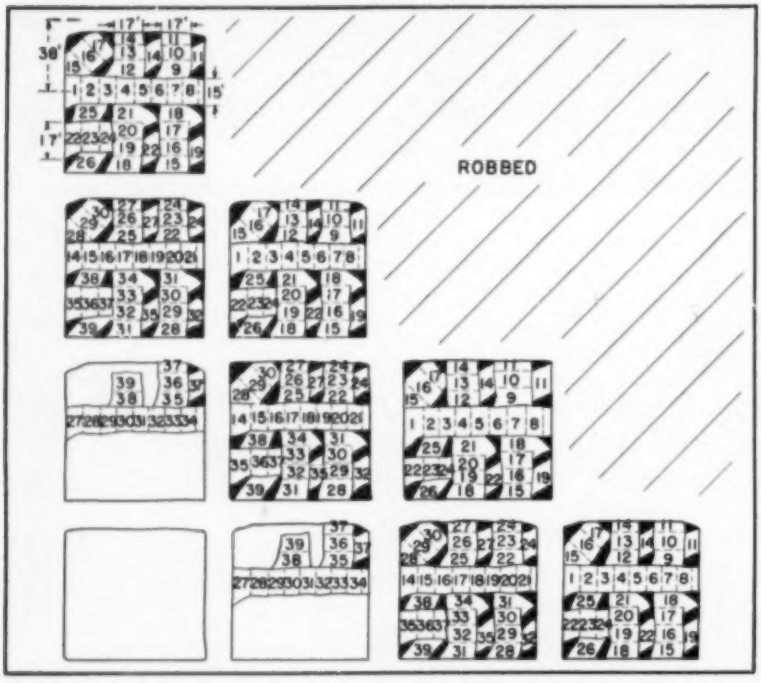
COMPLETED PILLAR LIFT as it appears before stumps are shot out. At extreme left, pillar is cut through to fall; in center, wing is cut through as last step before stumps are shot.

PILLAR FALL like this results after stumps are shot in completed lift. Falls are clean and only a few breaker timbers are required.



BOLTING CREW uses two air-leg stopers to drill 5½-ft vertical holes. Maximum distance between holes is 4 ft.

GOOD CLEANUP along the ribs results in greater recovery of coal.



PLANNED PILLAR EXTRACTION permits two working places per pillar. Roof control is good and extraction is cleaner with roof-bolting.

Secondary haulageways were timbered on 5-ft centers with 6x6-in by 13-ft sawed hardwood bars supported by 6-in round legs. Most of the bars were set flush with the head coal.

With a life expectancy of 15 to 20 yr for main haulways, Bethlehem management became intensely interested in roof-bolting as a possible means of providing better roof control at lower cost. Roof-bolting in 1948 was an almost unproved method of roof support and represented a change in the basic idea of roof control. However, mine management was quick to see the advantage of the new method if it could be made to work at Idamay.

Before any actual bolting was done, an educational program was initiated to train all mine supervisors in the theory and practice of roof-bolting. Top management knew that the section foremen in particular would have to be sold on roof-bolting before it could be tried in the mine. After the educational program was completed, equipment was purchased to start a program of roof-bolting in intersections outby the working faces.

At that time, Idamay was equipped with track-mounted mining equipment and, therefore, bolting equipment had to be likewise. A 4-wheeled push car with a rotary bed was designed and built at the mine. This unit had a counterbalanced standard for easy handling of the stoper in drilling holes upward at 45 deg. Air for drilling was supplied by a track-mounted 210-cfm air compressor.

When trial bolting began, the company started a program to sell all underground employees on the benefits of roof-bolting, particularly from the safety angle.

PIONEER BOLTING

Initial work with roof bolts was confined to bolting intersections outby the working section. Holes on 3- to 4-ft centers were drilled 8 ft deep at a 45-deg angle. Distance between rows was held to a maximum of 4½ ft. Bolts were 1-in slotted-wedge type and one 13-ft roof channel was used with each group of four bolts.

Four of the hand-pushed cars were made and bolting units were assigned to various mine areas. Early standards required that 4-in channels, 6.25 lb

CLOSE SUPPORT by bolts within 2 ft of the face is possible without hindering the cutting machine.

LOADING POINT for 8-ton cars is prepared by cutting machine. Main roof is rebolted after head coal is taken.

per ft, be used with the bolts. The roof channels were used to give maximum support during the early days of bolting and to help build up confidence in roof-bolting.

After this method of bolting proved successful and crew members had complete confidence in the new method of roof support, experimental areas were bolted without the channels. These were observed carefully and when no failures occurred, the channels were eliminated everywhere. There was no change in the spacing or drilling of holes. The next significant advancement was a saving in the cost of material by reducing the size of the bearing plate from 8x8x⅜ in to 6x6x⅜ in which, however, did not reduce the effectiveness of the bolt.

Angle bolting was continued in this manner for some months. In the meantime, management was searching for new equipment to make the job easier for the bolting crew. The next step was an improvement in equipment, brought about by mounting a chain-feed movable boom on a compressor to provide automatic uniform feed to the stoper. This unit also permitted drilling a distance of 10 ft from either side of the centerline of the track.

A significant saving in drill steel was achieved by converting to alloy hollow drill steel from a carbon type. Considerable breakage was experienced with carbon steel. Therefore management switched to Bethlehem Ultra Alloy in an effort to cut drill-steel cost. Since using the new alloy hollow drill steel, breakage has been cut 50%. The drills are fabricated at the mine from the Ultra Alloy as it comes from the mill and, since collarless drill steel is used, no heat treating is required. Multiuse detachable bits are used with the alloy drill steel.

BOLTING AT THE FACE

Roof-bolting had not been practiced very long before management realized that to be effective it had to be done at the face as soon as possible after the coal was extracted[1]. Plans were made to move the bolting crews to the working faces and fit roof-bolting into the face cycle.

Two air-leg stopers were assigned to each four-man crew. Air was piped to each working place from two 210-cfm air compressors located outby the working area. Stopers, impact wrenches, bolts and plates were pushed from place to place on the track-mounted cars. Dust collectors were added to the bolting equipment shortly after the bolting crews moved to the faces. The first units fitted nicely into the face cycle and no roof problems were encountered. Other crews were trained and 20% of the face units had this type of bolting equipment when Bethlehem decided to install some off-track mining equipment in December, 1950.

Success with roof-bolting in the track sections prompted management to include it in the off-track units. In place of the track-mounted push car, Bethlehem selected 3-wheeled self-propelled cable-reel cars to carry the bolting equipment and dust collectors. Air was still supplied from underground compressor stations located near the working areas. The off-track roof-bolting setup met with even better success than the track installation because the only physical effort required of the crew was in actual roof-bolting operations. Crews now install as many bolts as required by the loading unit and have time left to put in additional ones if more than normal roof support is needed.

Performance of the first off-track mining units was better than that of the track units. Therefore, additional equipment was ordered and, by July, 1952, 20% of the mine had been converted to off-track equipment. By the end of June, 1953, all face equipment had been converted to off-track units.

VERTICAL BOLTING

During the period of conversion to off-track equipment, progress and changes in roof-bolting were being made as experience increased and previous installations were checked. The most significant observation was that there was some lateral movement of the bolt in the hole when bolts were installed at 45 deg. Investigations showed that the bolts moved downward until they rested on the side of the drill hole and, as a result, the holding power of the bolt was decreased. Consequently, management decided to change from angle to vertical bolting. A new pattern of four 5½-ft wedge-type bolts installed vertically on 3- to 4-ft centers with 4½ ft between rows was selected and submitted to the West Virginia Department of Mines for approval. USBM roof-bolting specialists also were con-

COMBINATION of roof-bolting, wire mesh and gunite solved a tough roof problem at a main haulage intersection.

CENTRAL COMPRESSOR STATIONS, located on the surface near mine shafts, contain two 475-cfm automatic liquid-cooled units. Air enters the mine via a 4-in pipe line.

sulted before the new pattern was put into effect.

Regular tests were made on the bolts installed in the new pattern and results indicated that the bolts were holding better than those installed on an angle. Bolting crews used torque wrenches to assure that bolts were being tightened properly. After the vertical bolting had been tried for several weeks, pull tests were made to measure how well they were anchored and to compare the results with angle bolts. Results showed that the vertical 5½-ft bolts were consistently holding as well as, and generally better, than the 8-ft angle bolts. Consequently, all bolting was changed to the vertical pattern.

Shortly after the vertical pattern went into effect, management began considering the possibility of using expansion-shell-type bolts to reduce the cost of roof-bolting. If successful, approximately 25% would be saved in the weight of the bolt, which determines the cost, since the expansion-shell-type are ¾ in in diameter and the wedge-type are 1 in in diameter.

Other advantages recognized for the expansion-shell-type were easier and faster installation; less skill required in drilling since holes could be any depth equal to or greater than the bolt length; more headroom with no protruding bolts; ability to install bolts within 2 ft of the working face without interfering with cutting-machine operation since bolt heads are practically flush with the top. A trial installation was made and extensive tests were conducted to measure their holding ability.

As a result of the successful preliminary tests, Idamay changed to the expansion-shell-type at a saving in cost per bolt.

To speed installation of bolts and reduce the human effort required, Bethlehem now uses preassembled expansion-type bolts and keyhole roof plates. These bolts are delivered to the mine with the expansion shells already on. All the bolting crew does is insert the preassembled bolt into the large side of the keyhole and place it in the hole. Before the bolt is tightened, the man operating the impact wrench makes sure that the bolt is in the smaller part of the keyhole. A forged shoulder under the head of the bolt prevents the roof plate from crawling during tightening operation.

CENTRAL COMPRESSORS

As mentioned previously, air for the first roof-bolting units was supplied by underground 210-cfm units. Each of these units could supply sufficient air to operate two stopers effi-

ciently. This required one compressor to be assigned to each face unit. These units were subjected to severe service and maintenance was correspondingly high. Consequently, management decided to install larger-capacity permanent compressor stations on the surface near mine shafts. It so happened that existing shafts were strategically located near the center of active working areas and fitted very nicely into the central compressor setup. A liquid-cooled 475-cfm unit, driven by a 100-hp motor, was put into service in June, 1951.

On the basis of the performance of the first central station, it was decided to add more compressors as more bolting units went to work underground. At present there are two of the outside automatic units in operation. They supply air to five bolting units using 10 stopers and a construction crew using air intermittently.

Bethlehem management points out the following advantages to their outside compressor stations: intake air is clean to start with and, therefore, maintenance is less; air splits needed at underground compressor stations are eliminated; maintenance is easier and skilled mechanics can give close attention to the units; AC power gives uniform voltage to the compressor motor; failures have been insignificant to date; the pipe line from the compressor to the section acts as a receiver and permits better utilization of the compressor; and automatic controls reduce the amount of attention needed.

Air is piped from the outside station to the underground working areas in 4-in pipe connected with threadless couplings. The pipe enters the mine through a 300-ft air shaft and is supported only by the pipe couplings. There has been no leakage or failures from suspending the pipe in this manner. A 2-in line carries air from the main underground 4-in line to a point near the section coal-loading station. From here, a 1¼-in pipe, also connected with threadless couplings, is extended into each working place. Pipe lines are suspended from roof bolts to provide better clearance.

MINING SYSTEM CHANGED

Better roof control resulting from use of roof bolts has permitted several changes in the original block system of mining. First was a change in direction of mining with respect to the cleats. Entries were driven on the quarter face because of tender roof conditions. Now, they are driven on full faces and full butts and there is no roof-control problem. In the past, when wood roof support was used, there was no difficulty encountered in developing entries on the butt cleats, but trouble was met when driving on the face cleats.

When equipment was converted from track to off-track, mining projections were altered from angle blocks to square blocks. This was done so that shuttle cars could use alternate travel routes between the loader and the mine car. Roof-bolting permitted greater speeds than possible with wood timbering because the shuttle-car operators could turn corners without fear of dislodging a collar leg. Another advantage of the square blocks is that no small triangular-shaped blocks are present in pillar extraction. Their removal required better than average mining skill and, consequently, decreased output.

BOLTING IN PILLARS

After roof-bolting had proved successful in development work, the next step was to try it in pillar extraction. First, it was tried in conjunction with wood timbers and gradually all but the single posts were eliminated. Evidence of success of bolting in pillars is a 7 to 10% increase in the quantity of coal recovered. This is the result of cleaner extraction of stumps and recovery of coal formerly lost in the gob.

Another advantage of bolting in pillar work at Idamay is better control of pillar falls. Falls are good and there has been no squeezing or riding of weight beyond the fall line. Since there are only a few timbers set in the pillars, the cutting machine is able to cut completely through the pillar into the gob and the loading machine is able to load all of the coal. The only coal left in the lift across the pillar is a small protective stump, about 5 ft square, at the beginning of the lift. This stump is shot out after the lift has been completed.

Before roof-bolting was started in pillar work, only one place was worked per pillar, and it was necessary to work eight places in separate pillars. Now, with rapid and cleaner extraction under the roof bolts, it is possible to work eight or more places in a group of four pillars. This new method has the advantage of speeding extraction of individual blocks and permits better supervision because working places are concentrated. Details of the pillar-extraction method are shown in an accompanying illustration.

SPECIAL APPLICATIONS

Application of roof-bolting to special jobs has paid off at Idamay, particularly in rehabilitation work and main-haulage permanent roof support. Cleanup of old entries, originally supported by wood timbers, is a continuing expensive job. Before roof-bolting, temporary timbers were set to protect the cleanup crews and later replaced by permanent steel and wood sets. Now, roof bolts are installed as cleanup progresses and, as a result, the work moves much faster and roof support cost is much lower.

In some areas falls up to 15 ft or higher were encountered and ribs were cracked and irregular. To put them in safe condition, steel channels were bolted to the ribs in the weak areas. There has been no significant sloughing of the ribs, and bolt anchorage has remained good.

An interesting combination of roof-bolting, reinforcing wire mesh and guniting has solved a tough roof problem at a main-haulage intersection. The drawslate and wild coal over the main seam had been taken down, leaving the main shale roof exposed. Roof channels, 13 ft long, were installed with four 8-ft bolts angled upward at 45 deg. These were thought to be sufficient to hold the top, but air slacking caused the roof to chip away between the channels. To prevent this, management decided to put a thin layer of reinforced concrete over the area.

Standard 4-in-mesh reinforcing wire was put in place against the roof with roof bolts and some channels. The roof was scaled and prepared and sufficient gunite was applied to cover the wire mesh and seal the roof from air. To date this area has given no further trouble.

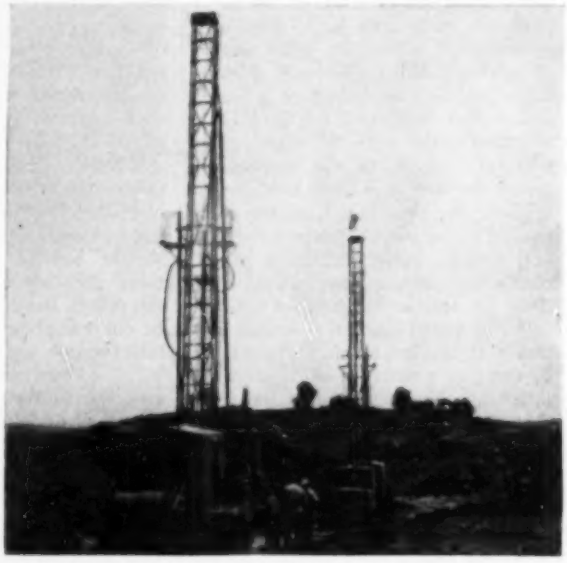
The most recent special application has been in main-haulage roof support where the head coal is thin and has broken out between bolts. To support any loose material, 8-in I-beams have been installed with roof-bolt suspension. A heavy steel saddle plate, suspended from the roof with four bolts, supports each end of the beam. All bolts are tightened to normal torque after the beam has been put in place. This method has been used for 6 mo, with no yielding or failure.

In summing up after installing 555,878 bolts in 138.42 mi of entry, Idamay management points up these benefits of roof-bolting:

1. Greater safety for all underground workers.
2. More output per loading unit.
3. Increased recovery of coal.
4. Greater flexibility and mobility in mining.
5. Reduction in cost of handling supplies.
6. Improved ventilation.
7. Elimination of accidents from handling or dislodging timbers.
8. Cheaper rehabilitation of non-bolted areas.

SETTING NEW RECORDS at Hanna's Georgetown No. 12 strip operation is this 46-yd shovel working in banks 45 to 70 ft high. Well prepared overburden, consisting of shales and limestone, makes digging easier.

NEW-TYPE 46-YD DIPPER gets a bigger bite with less effort. Curved spade-type design permits easy digging.



BETTER BANK PREPARATION resulted from vertical blastholes drilled by rotary dry-type drills.

What's Behind . . . 1,522,154 Yards in One Month?

Ten years of progress in dipper design, overburden preparation, maintenance, engineering and management-employee teamwork bring Georgetown No. 12 a new 31-day record of 1,522,154 yd.

WHAT COOPERATION between management, men, engineers and manufacturers can achieve in getting more out of equipment is evidenced in the steady improvement in equipment performance at the Georgetown No. 12 strip mine of the Hanna Coal

SPECIAL MAINTENANCE TRUCKS provide all facilities for rapid service in pit. Down time is kept to a minimum by use of spare unit assemblies. Smooth team work by maintenance crew has reduced time needed to change units.

BEEFED-UP CRAWLERS reduce down time resulting from damage caused by rocks rolling from spoil bank.

AN INCREASE in shovel output resulted from changing the pitch of the dipper from 111 deg to 108 deg.

By A. E. FLOWERS

Associate Editor, Coal Age

Co., Div. Pittsburgh Consolidation Coal Co., Adena, Ohio. There, a 46-yd dipper on a shovel 10 yr old and originally designed to swing a 35-yd unit, set a new 31-day record of 1,522,154 yd of overburden in 1953, topping a previous record of 1,505,-143 yd in 31 days in August, 1951.

These records and a consistent performance of over 1¼ million yards per month reflect these developments from long-term and intensive efforts:

1. Continual improvement in bucket design, permitting greater payload per pass.

2. Changes in drilling and blasting techniques to produce better fragmentation, making shovel loading faster and easier.

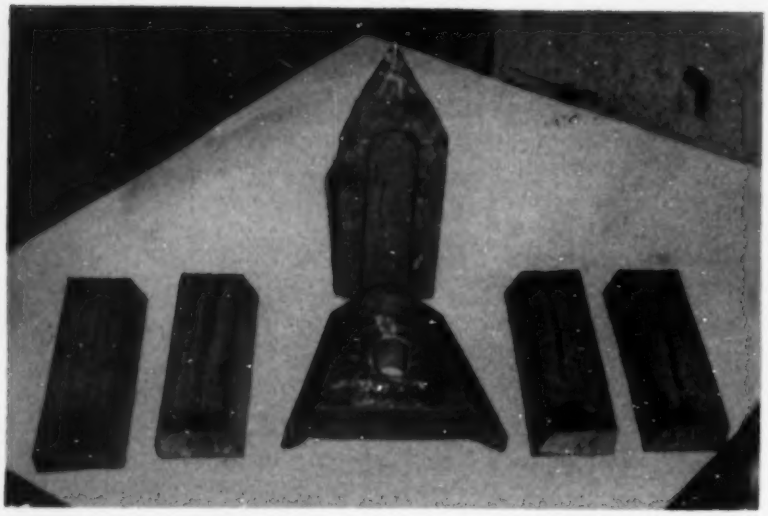
3. Thorough engineering analysis of problems and development of new methods and materials.

4. Improvements in maintenance methods and materials.

5. Cooperation and team spirit among all employees of the company.

BUILDING CAPACITY INTO THE STRIPPER

Since dipper capacity is a major element in the performance of a stripping shovel, this was one of the first problems to be tackled in the Georgetown improvement program. Experimental work with alloy materials to decrease dipper weight began in 1944 under the direction of James Hyslop, now president of the Hanna Coal Co. It was his belief that with the proper materials in the dipper, considerable dead weight could be eliminated and the dipper could be made



DIPPER TEETH are fabricated in Hanna's central shop from these elements.

JIG ASSEMBLY of dipper teeth is speeded by semi-automatic welding unit. Assembled teeth are heat treated to Brinell hardness of 400.

larger, thus getting more payload with no more effort from the power unit. Hanna men began a cooperative program with steel manufacturers and their metallurgists to develop new-type lightweight alloys for shovel dippers. As a result of the development of new alloys and modifications in dipper design, the original 35-yd unit has been replaced with successively larger dippers. Now, a 46-yd dipper carries the larger load with no more strain on the shovel power source than with the old 35-yd unit. Live weight has been substituted for dead weight and the total load on the shovel remains the same.

Until the new alloys entered the picture, the 35-yd dipper used with a Marion 5561 electric unit was considered the largest possible. Hanna approached the problem of increasing dipper capacity from several angles. The first was to develop with the manufacturers the lightweight alloys that would stand the rough abrasive service encountered in removing overburden. The second was to redesign the dipper to remove unnecessary parts or, if the parts were necessary, to move them to other locations.

In the orginal 35-yd unit, the swivel was attached to the dipper, and the dipper had a heavy cast flat lip. Bucket castings were all integral parts, including the door. The bucket had "pitched-down" teeth, pointing away from the bucket to the bottom of the pit. All parts were mainly made of manganese steel containing 12 to 15% manganese. The dipper handle was rectangular in shape.

IMPROVING THE DIPPER

In 1947, the first 40-yd bucket was completed after development of alloys and redesign of the bucket Outstanding changes from the 35-yd unit were as follows: (1) use of alloy plate along with some castings, and removal of the swivel from the dipper to the top of the dipper stick, (2) cast ears and lip, (3) dipper-teeth bases cast integral with the lip and (4) a fabricated dipper door. These changes produced a dipper that weighed no more than the old 35-yd unit, both fully loaded.

Shovel output with the 40-yd dipper averaged 747,387 cu yd for the period 1947 through 1949, compared to an average output of 686,117 cu yd for the period 1945 through 1947, when the 35-yd dipper was used.

In the year 1948, top management spent some time on a study of blasting. By increasing the amount of explosives used, the shovel moved 1,114,000 cubic yards in the month of October. From this point, the program was shovel design plus better blasting practice resulting in better fragmentation.

In 1949, the first 45-yd dipper, incorporating many radically new design features, was completed. Among the new features was a box-section lip curved on a 10-ft radius. Dipper tooth design was changed from cast type with shanks to wedge type with slotted bases. These new tooth bases had long tails extending over the lip area. It was soon learned that this made the lip too rigid with a resulting tendency to crack along the weld at the tail of the bases. Research began at once to redesign the teeth. One significant improvement was in the alignment of the teeth with respect to the dipper. For the first time teeth were welded in line with the dipper and were not pitched down toward the bottom of the pit. Another significant improvement was redesign of the trip mechanism to a double-lever system. Dipper interiors were ribbed with strips of hard metal in an attempt to speed dumping of spoil.

Average monthly yardage for all 46-yd dippers in 1949 was 776,381. In 1950 it rose to 843,947 and in 1951 climbed to 1,025,037. Further improvement was made in 1952 when the average yardage was 1,053,144. The average for the period January

through April, 1953, moved up to 1,153,760 cu yd. During the month of April the two units with the latest type dipper moved an average of 1,400,221 cu yd of overburden. One of these units did not have the advantage of the new-type bucket for the entire month, but showed remarkable improvement when it was added. Management is confident that the average output will increase when all shovels are equipped with new buckets.

TODAY'S DIPPER DESIGN

Improvements were made continuously from 1949 to the present, and research will continue as experience in the field becomes greater. The present dipper has a solid 6½-in heat-treated alloy plate lip. Tooth bases, made of SAE 4337 alloy with carbon modified to 0.26, are butt welded to the edge of the lip with very large radii over contour changes. This method of welding reduces stress concentrations that can be the cause of much cracking.

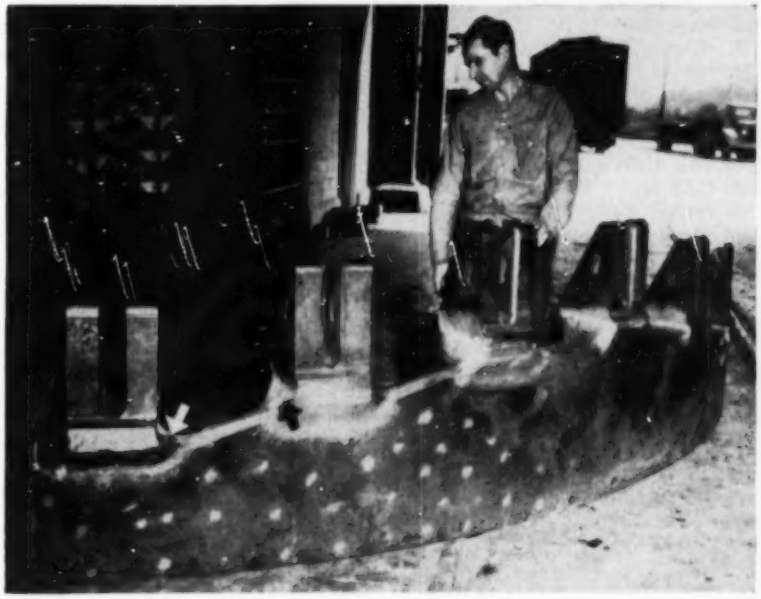
Teeth are now welded to the bases in line with the dipper to eliminate as much drag as possible and get maximum digging action. All castings were eliminated and the inside of the dipper was made smooth after operating practice proved that the previously-built dippers with ribbed interiors hindered rather than aided unloading. With the smooth interior, unloading is faster regardless of the point of dumping, whereas with the ribbed interior, dippers could not be unloaded rapidly and completely when dumping close to the foot of the spoil bank.

While the dipper was undergoing changes, the dipper stick was redesigned with a different cross section and reinforcing member. New features are an increase in depth of the stick while retaining the old width and replacement of vertical diaphragms, spaced on 3-ft centers at 90 deg to the axis of the stick, with one diaphragm parallel to the axis of the stick. As a result of these changes there is a uniform bending under load and a reduction in seam cracking.

Another important change in the design of the dipper lip was to round the leading edge so that the dipper teeth would enter the spoil bank like a spade. The two middle teeth enter the bank first, providing the initial wedge and easing the entry of the two following pairs of teeth. Hanna management points out that the combination of a curved dipper and a curved lip with a rounded spade-like edge permits faster loading of the dipper with less strain on the shovel and with less power consumption.

TOOTH BASES of SAE 4337 alloy are butt welded semi-automatically to the dipper lip. Lip, made from 6½-in heat-treated alloy, is curved on 10-ft radius.

LIP AND TEETH are in same line as side of dipper, making a straight line from door to tips of teeth. This aids digging and speeds unloading.



VERY LARGE RADII at contour changes reduce stress concentrations in welds and decrease cracking. Note step positions for teeth.

Hanna fabricates and heat treats dipper teeth in its Central Shop at Georgetown. Teeth are made up of alloy steel with points or tips of SAE 4340 castings. They are assembled in jigs by workers using semi-automatic electric welding machines. After they have been fabricated, they are heat treated to a Brinell hardness of 400 before being welded to the dipper lip.

Another recent increase in shovel output has resulted from changing the pitch of the shovel dipper from 111 deg to 108 deg. This makes the dipper arc shorter, taking the dragging action out and transferring it to a digging effort.

An electric load indicator mounted in the shovel operator's cab tells him when the dipper is full or when he is straining the shovel. This device takes the human element out of loading, assures a full load and starts the hoist and swing cycle as quickly as possible. This adds up to more yard-

age per shift with less wear and tear on the equipment and a minimum of effort on the part of the operator.

BEEFING UP THE CRAWLERS

While shovel output was being increased by redesigning and increasing dipper capacity, other methods of improving performance were being investigated. Management began seeking ways to reduce shovel down time by strengthening shovel parts that were subject to the greatest wear and stress. Experience indicated that shovel crawlers were being damaged by rocks rolling down from the spoil bank and thus causing lost time while repairs were being made. To correct this, Hanna completely reinforced all external surfaces with low-alloy plate and bar stock. Crawler pads were changed from a narrow roller path with a thick heavy cross section to a wide path with a thick section. Rollers were changed from a 4-in to a 5-in path.

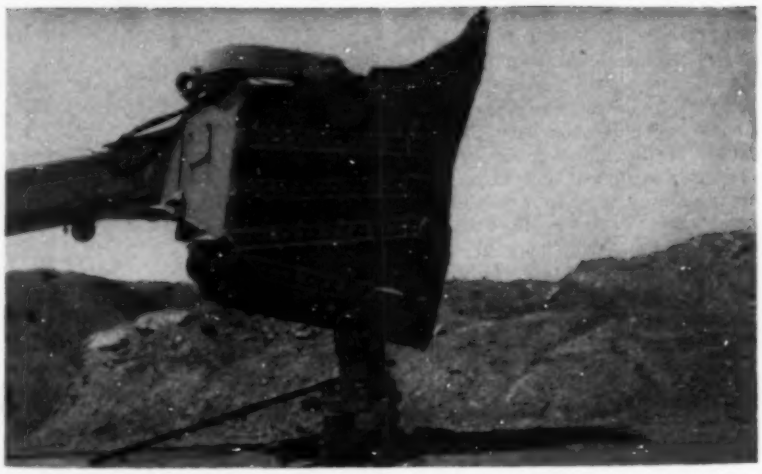
In addition to beefing up the external parts, the following changes also were made:

1. Original cast-teeth gears of SAE 1045 metal were changed to cut-teeth gears of heat-treated alloy material.
2. Crawler shafting was changed from SAE 1045 metal to heat-treated SAE 4150 steel.
3. Bronze bushings were changed from standard bronze to high-pressure bronze.
4. Many critical shafts were changed to heat-treated SAE 4150 alloy.

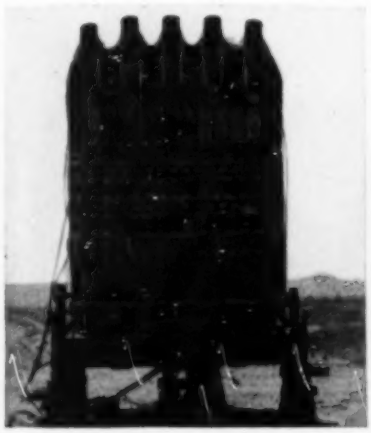
PLANNED MAINTENANCE

Specialized planned maintenance by crews constantly seeking and finding ways to reduce shovel down time contributed greatly to the record-breaking performance. All maintenance jobs are planned well in advance and scheduled so that loss of productive time will be a minimum. The maintenance inspector constantly checks all equipment and determines when maintenance should be done. He must decide if the job is to be done in the field or whether it would be better to replace the unit with a spare and take it to the Central Shop, where it can be repaired without interfering with shovel operation.

Regardless of where the job is to be done, a detailed description of the work is made at least 2 to 3 wk before the work is started. Included in the planning are an estimate of the time, labor and materials necessary to complete the job. Copies of the estimate are sent to the mechanical superintendent, shop superintendent and master mechanic so they can plan their parts in advance. This type of setup has resulted in increased shovel output and more efficient maintenance.



INCREASING DIPPER CAPACITY from 35 to 40 yd was one of the first steps in increasing shovel output. Greater capacity did not increase weight.



ALLOY PLATE cut weight of 40-yd dipper. Dipper-teeth bases were cast integral with lip and door was fabricated; swivel was moved to end of stick.

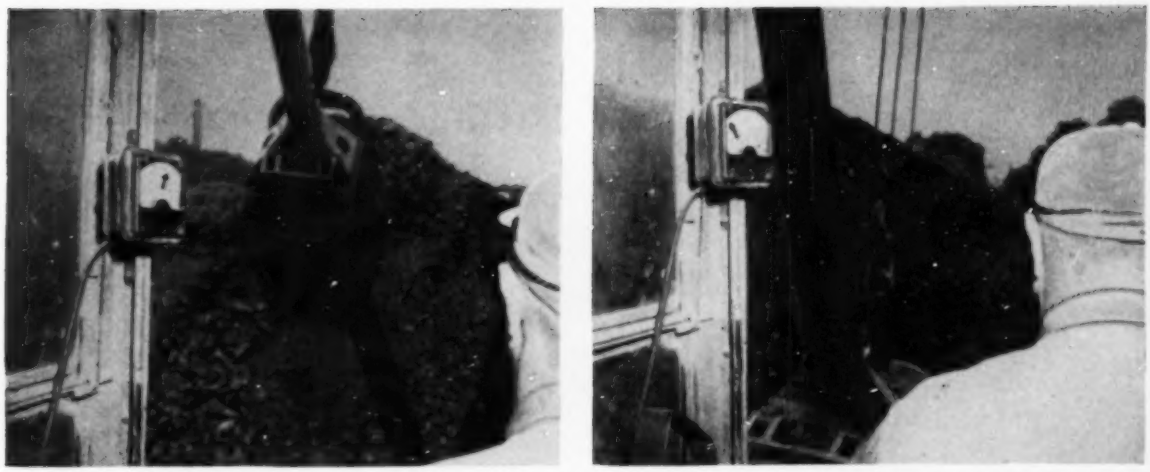
Some of the results achieved by the maintenance crew are:

1. A decrease in the time to change a crawler from 8 to 2 hours.
2. A decrease in the time to change a rope from 2½ to ½ hour.
3. A decrease in the time to change a boom cable from 16 to 5 hours.
4. A decrease in the time to change a dipper from 14 to 5 hours.

Much of the credit for the remarkable reduction in down time is the result of good crew organization and the spirit of the men themselves. Each man is a specialist at some job in making unit changes and does the same job each time a unit is replaced. In addition, management encourages suggestions from the men on ways to complete the job easier and faster. As a result, team spirit is high and contributes to more efficient maintenance.

Special maintenance and service trucks add greatly to maintenance-crew efficiency. These units are used in various combinations or separately depending upon the job to be done. Among the trucks are a special small-tool truck containing all types of small hand tools and parts normally required on maintenance jobs; a large-tool trailer used to transport heavy tools; three flat trailers for hauling wood blocks; a special heavy-duty trailer for hauling buckets and shovels up to 100 tons; a small-parts truck; a welding truck; and a truck-mounted crane. Trucks are loaded with all the parts and tools necessary to complete a job according to the preliminary estimate and are sent to the job for the entire shift or until the work is completed.

Two-way radio communication be-



LOAD INDICATOR in operator's cab shows when dipper is full (left). Needle returns to zero on back swing (right).

tween all stripping units, supervisors and Georgetown headquarters is an added feature that cuts down time and provides better supervision. With radio it is possible for a shovel operator to get maintenance help almost immediately, whereas it took an hour or more before radios were installed. Another advantage is that the boss can be reached anytime and in a matter of seconds can be headed to the particular unit needing help. If a spare part is needed to keep a unit going, it can be started on its way merely by calling the Central Shop. Supervisors and service trucks spend less time traveling because of the reduced need for traveling to check up and correct trouble, and as a result there is less wear and tear on cars and service trucks.

Improvements in electrical equipment and controls have been made along with the advances in bucket design and shovel improvement. Efforts have been concentrated on balancing the motions of the shovel and in providing better power supply to the shovels. In all cases effort has been directed toward increasing speed whenever possible.

Centralized automatic lubrication of large stripping shovels was installed in 1944 and since then has contributed greatly to smooth shovel operation. Shovel output has been increased 45 min per day and the hazard of having a man climbing the boom in all kinds of weather has been eliminated. Bearing damage has been eliminated because bearings receive positive measured amounts of grease at regular intervals. Now, a complete lubrication cycle except for circle rollers requires only 30 to 45 seconds. Circle-roller bearings are lubricated in 4 to 5 min each 8-hr shift. Previously, 2 hr per shift was required to do the job by hand.

BETTER BANK PREPARATION

A third factor contributing to the record-breaking performance was the improvement in overburden preparation after vertical drilling was started. As stripping progressed toward populated areas, airborne concussion resulting from horizontal blasting became objectionable. At the same time, stripping was being carried to high banks which did not permit good fragmentation with horizontal drilling. These two problems were largely responsible for converting to the vertical-type drill.

Joy 58BH electric-powered dry-type rotary drills were purchased to handle the vertical drilling job. Initial holes were drilled 7⅞ in in diameter, charged with No. 6 Airmite and fired with delays to reduce concussion in the nearby populated areas. It was soon learned that better fragmentation was possible with vertical drilling because explosives could be concentrated in the harder strata. As a result of better bank preparation, shovel output was greatly increased. Along with increased shovel output, better bank preparation helped effect the following savings: (1) reduction in shovel maintenance because of easier digging; (2) reduction in shovel downtime; (3) reduction in power demand and consumption because the shovel worked easier.

Considerable research has been done at all Hanna strip mines on drilling patterns and shooting sequences. One result of this has been to increase blasthole diameter from 7⅞ in to 8½ in, permitting the use of No. 8 Airmite bags. The same quantity of Airmite is used per hole but it is now concentrated more in the harder strata. Consequently, fragmentation has been improved and digging has been made easier for the shovel. This adds up to more yardage.

Blastholes are drilled on 30-ft centers in rows 30 ft apart, loaded with Airmite and fired in groups of three or four. As many as 14 holes have been fired at once using M-S delays and Primacord for detonation. In most instances two rows of holes are fired to get the maximum benefit per pound of explosive. Experience proved that less explosive was required when two rows of holes were fired together.

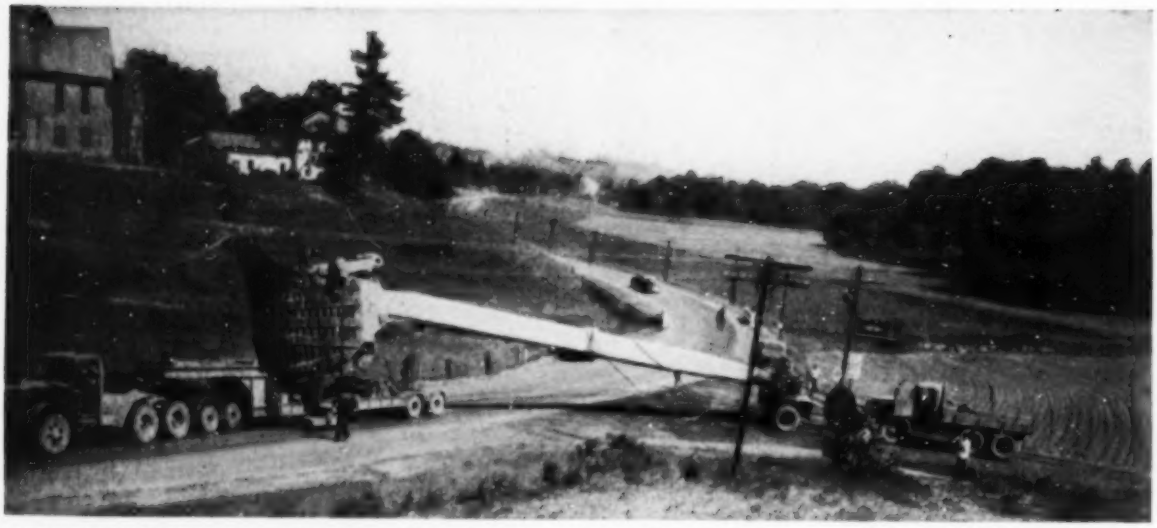
Better overburden preparation has been the result of constant continuing research at the Hanna properties. Detailed records are kept of each drill's performance and compared with the past. Much work has been done with drilling patterns and shooting sequences to develop the best method for a particular area or type of rock.

As new areas are stripped or as changes are encountered within an area, the drilling pattern is altered as the type and thickness of overburden varies. Variations in hardness and thickness of strata are carefully observed and explosives are concentrated at the zones of strongest rocks. This assures maximum fragmentation per pound of explosives.

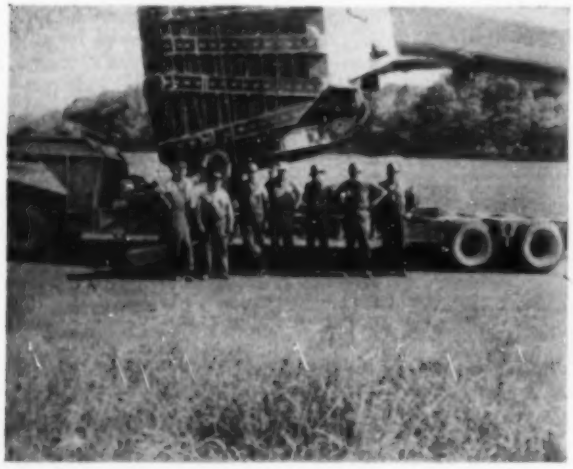
An electric blasting device that saves labor in connecting blastholes and gives a greater number of delays than possible with explosives was designed and built at Hanna. The complete machine is housed in a 12x12x 24-in box and is readily transported to the blasting area.

DRILL PERFORMANCE STUDIED

Detailed performance records, com-

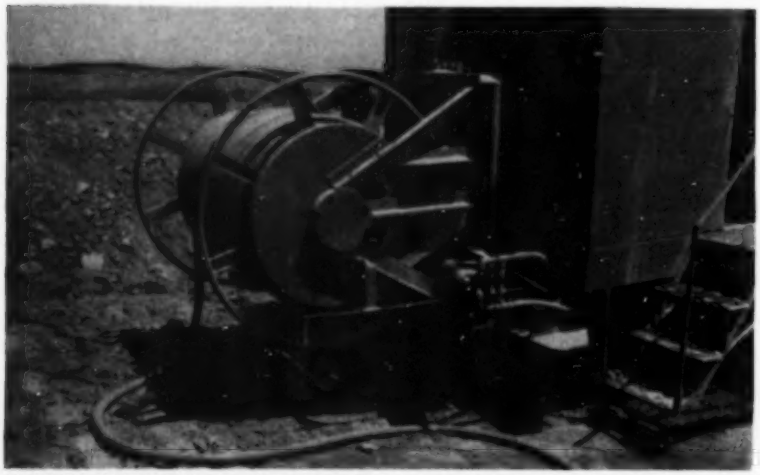


SPECIAL TRUCK, capable of handling 100-ton load, is used by maintenance crew to haul heavy parts and dippers to Central Shop for rebuilding. Moves are planned in advance and carried out according to a definite schedule.



SPECIALISTS at moving large equipment and maintenance work are these members of the Hanna bull gang.

BULL GANG TRUCK is equipped with all the tools and parts necessary to handle maintenance in the field.



COMPANY-BUILT hydraulic cable reel is powered from drill hydraulic system. Unit saves wear on cable and eliminates manpower required to move cable.

Supervisory Personnel Hanna Coal Division of Pittsburgh Consolidation Coal Company

James Hyslop, President

James D. Reilly, Vice President

Andrew Hyslop, Jr., Chief Engineer

J. S. Harmon, General Superintendent of Strip Mines

Donald D. Saxton, General Superintendent—Georgetown #12 Mine

C. L. Secrest, Superintendent—Georgetown #12 Mine

George M. Pyle, Superintendent—Bradford Mine

Howard A. Singer, Superintendent—Cadiz Mine

piled from data recorded by men operating the equipment, provide valuable information to management, both on drill performance and type and cost of maintenance. As a result of these studies, Hanna has changed the drills as follows:

1. Mast height was increased so that a 40-ft drill stem could be used. This permits drilling holes up to 80 ft deep with only one additional rod.
2. The rotary table was redesigned with heavier bearings and gear teeth, and a new oil-sealing system was installed.
3. A tool cab was added to store small tools normally used by the drill crew.
4. Air-powered clutches were applied to replace the manual type.
5. A hydraulic reel was added to handle the power cable. This unit receives power from the drill hydraulic system through a hydraulic motor that drives the reel through a chain and sprocket arrangement. The reel saves wear and tear on the power cable and eliminates the manpower required to handle the cable when the drill is moved to a new site.

Spare drill assemblies, such as air compressors and rotary tables, are available for quick replacement in the field. As soon as any unit assembly shows signs of wear or weakness that might cause an outage, it is replaced and taken to the Central Shop and rebuilt. Efforts are directed toward getting maximum output during the working hours by application of a system of inspection and preventive maintenance.

ENGINEERING FOR OUTPUT

Engineering analysis, time studies and performance records have become increasingly important at the Hanna operations since the end of World War II. Careful analysis and evaluation of facts determined by daily detailed performance records have paid dividends in greater output, less down time and lower maintenance. An extremely valuable intangible benefit has been the psychological effect on the employees of the daily performance charts issued to each unit.

Conventional methods for keeping records and getting data were considered inadequate when Hanna management became interested in gathering detailed information on equipment performance. Daily detailed reports on each piece of machinery, such as stripping shovels, drills and haulage trucks, were necessary if weaknesses were to be spotted. To get the information desired would have required assigning one man to time-study each unit. This was not considered a practical solution.

Hanna's answer to the problem of getting facts and figures was twofold. The first step was to train the individual operators to keep an accurate daily record of their machines. Considerable time and effort was expended in training and in pointing out the benefits of having good data on equipment performance. To help make the job easy, management installed the following automatic recording devices: (1) an electric counter to record the number of passes made by the stripping shovel, and (2) a degree-of-swing totalizing instrument that records the total number of degrees of arc the shovel swings in a shift. All the shovel operators have to do is read a number on a meter and call it in over the radio or jot it down on the daily report sheet. Equipment operators also record on special printed forms the length and type of delays.

Maximum benefits are derived from the records by giving a copy to all personnel. For example, each shovel operator is given a copy of the performance of all other shovels and can compare his performance and delays with them and spot his strong points and weak ones. Similarly, all drill operators receive a copy of all drill performances. Machine operators look forward to receiving a copy of the performance and post it in the cabs of their machines. A strong competitive spirit exists among the various units to beat the record and be the leader each month.

The engineering department acts as a clearing house for all data on equipment performance and organizes it for quick reading and ready reference.

COOPERATION GETS RESULTS

The cooperation and teamwork among all Hanna employees cannot be overemphasized as factors in setting the new record. Willingness of management to invest large sums of money in the search for new methods and equipment, to try new ideas originating within the company, and to improve existing equipment, set the pace for establishing the new record. Coupled with this was the cooperation and spirit of the employees who were receptive to new ideas, new equipment and new methods. They were urged to offer suggestions for improvements that would make the job easier and increase output. Management listened carefully to all suggestions and has benefited greatly by being able to have the entire organization seeking new and better ways of doing a better job.

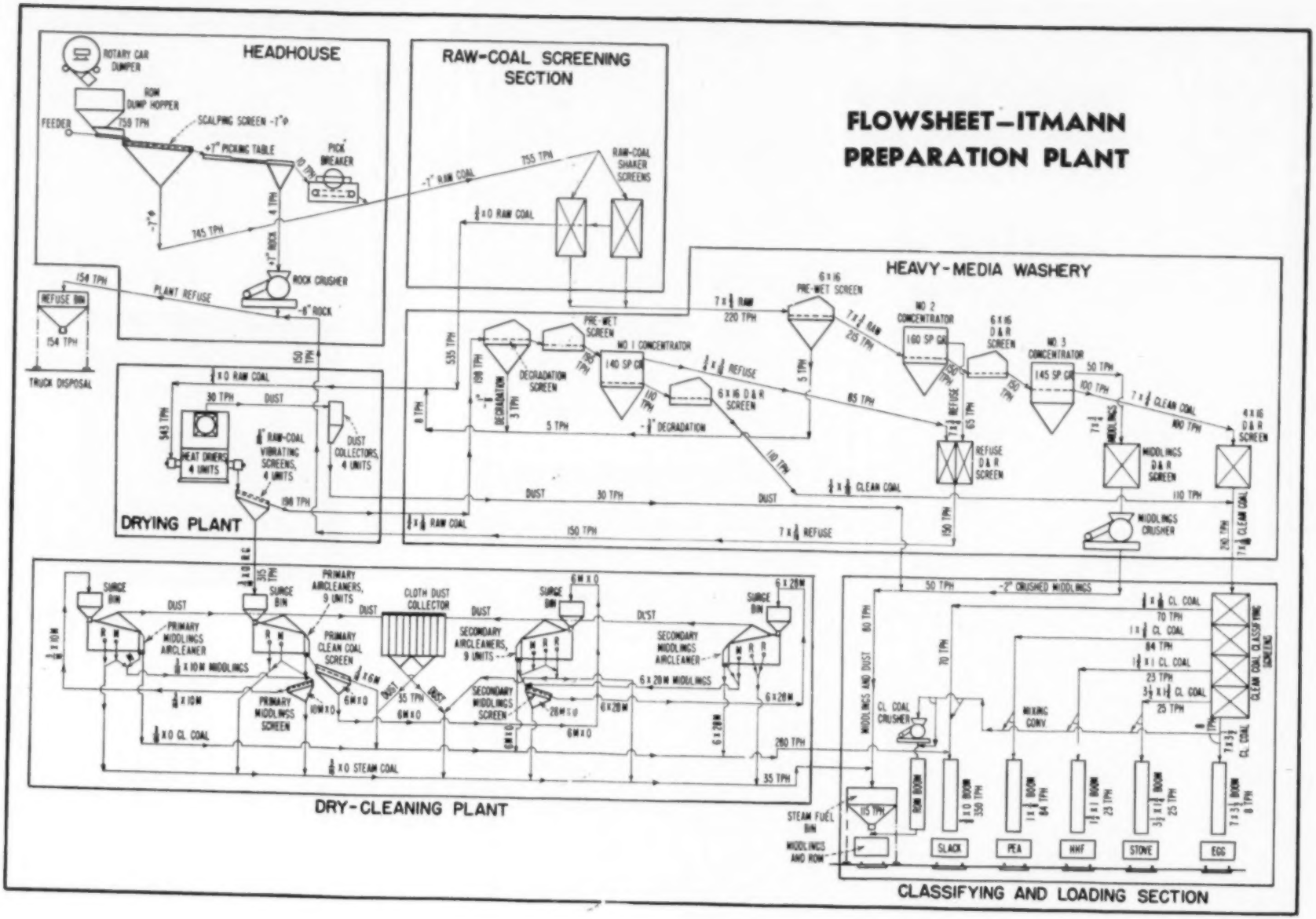
Hanna management also makes sure that its men know that it appreciates their efforts. For instance, the latest record-breaking performance was honored by a banquet for the crews. Top Hanna officials, along with some of the officials of the Pittsburgh-Consolidation parent organization, were present to express their appreciation for a job well done.

With the crews and other members of the Hanna company, an outstanding job was done by the manufacturers and company electrical and mechanical engineers. Many tough problems were solved by steady, laborious work and research. As a result of their efforts the new improved bucket was made a reality.

Hanna leaders point out that to set new records it takes the organization and teamwork of labor, management, engineers, maintenance crews and bag right over the revolving brush.

Power Sweeper Speeds Cleanup

CUTTING CLEANUP TIME to 5 or 10 min from 30 to 45 min is achieved with a self-propelled gasoline-powered sweeper at the Georgetown No. 12 mine of the Hanna Coal Co., Div. of Pittsburgh Consolidation Coal Co. Dirt and gravel are left on the floor by a fleet of 47-ton haulage trucks that are serviced in a 40x100-ft quonset building. At the end of each shift, one man operates the unit that combines sweeping and suction to clean a 30-in path as it propells itself around the shop. The only work done by the operator is to guide the unit over the area to be cleaned. Coarse material is swept to an airtight compartment at the end of the machine and fine dust is gathered in a bag right over the revolving brush.


FLOWSHEET—ITMANN PREPARATION PLANT
HEADHOUSE
ROTARY CAR DUMPER
ROM DUMP HOPPER
FEEDER
750 TPH
SCALPING SCREEN -1"ø
+1" PICKING TABLE
PICK BREAKER
-1"ø
745 TPH
4 TPH
+1" ROCK
ROCK CRUSHER
-6" ROCK
154 TPH
PLANT REFUSE
REFUSE BIN
154 TPH
TRUCK DISPOSAL
RAW-COAL SCREENING SECTION
-1" RAW COAL
755 TPH
RAW-COAL SHAKER SCREENS
½ X 0 RAW COAL
HEAVY-MEDIA WASHERY
6 X 16 PRE-WET SCREEN
7 X ½ RAW
220 TPH
NO 2 CONCENTRATOR
160 SP GR
6 X 16 D & R SCREEN
NO 3 CONCENTRATOR
145 SP GR
4 X 16 D & R SCREEN
PRE-WET SCREEN
NO 1 CONCENTRATOR
140 SP GR
DEGRADATION SCREEN
6 X 16 D & R SCREEN
REFUSE D & R SCREEN
MIDDLINGS D & R SCREEN
MIDDLINGS CRUSHER
535 TPH
198 TPH
3 TPH
5 TPH
110 TPH
65 TPH
85 TPH
100 TPH
50 TPH
7 X ½ CLEAN COAL
400 TPH
110 TPH
150 TPH
7 X ½ REFUSE
½ X ½ CLEAN COAL
½ X ½ RAW COAL
DUST 30 TPH
DRYING PLANT
½ X 0 RAW COAL
30 TPH DUST
543 TPH
HEAT DRIERS 4 UNITS
¾" RAW-COAL VIBRATING SCREENS, 4 UNITS
DUST COLLECTORS, 4 UNITS
198 TPH
DRY-CLEANING PLANT
SURGE BIN
PRIMARY AIRCLEANERS, 9 UNITS
CLOTH DUST COLLECTOR
SECONDARY AIRCLEANERS, 9 UNITS
PRIMARY MIDDLINGS AIRCLEANER
PRIMARY CLEAN COAL SCREEN
PRIMARY MIDDLINGS SCREEN
SECONDARY MIDDLINGS SCREEN
SECONDARY MIDDLINGS AIRCLEANER
DUST
¼ X 10M MIDDLINGS
¼ X 10M
¼ X 0 CL COAL
¼ X 0 STEAM COAL
6 X 20M MIDDLINGS
6 X 20M
280 TPH
35 TPH
CLASSIFYING AND LOADING SECTION
50 TPH -2" CRUSHED MIDDLINGS
MIDDLINGS AND DUST 60 TPH
70 TPH
84 TPH
25 TPH
CL COAL CRUSHER
MIXING CONV
CLEAN COAL CLASSIFYING SCREENING
1 X ½ CL COAL
1 X 1 CL COAL
3½ X 1½ CL COAL
7½ X 3½ CL COAL
ROM BOOM
1 X 0 BOOM 350 TPH
1½ X 1 BOOM 84 TPH
1½ X 1 BOOM 25 TPH
3½ X 1½ BOOM 25 TPH
7½ X 3½ BOOM 0 TPH
115 TPH
STEAM FUEL BIN
MIDDLINGS AND ROM
SLACK
PEA
NUT
STOVE
EGG

NEW 760-TPH PLANT was planned by Pocahontas Fuel for maximum coal quality and uniformity. Air-cleaning plant is at left, with washery behind, loading facilities at right, and round bin for domestic coal in foreground.

How Itmann Prepares "Original Pocahontas" Coal

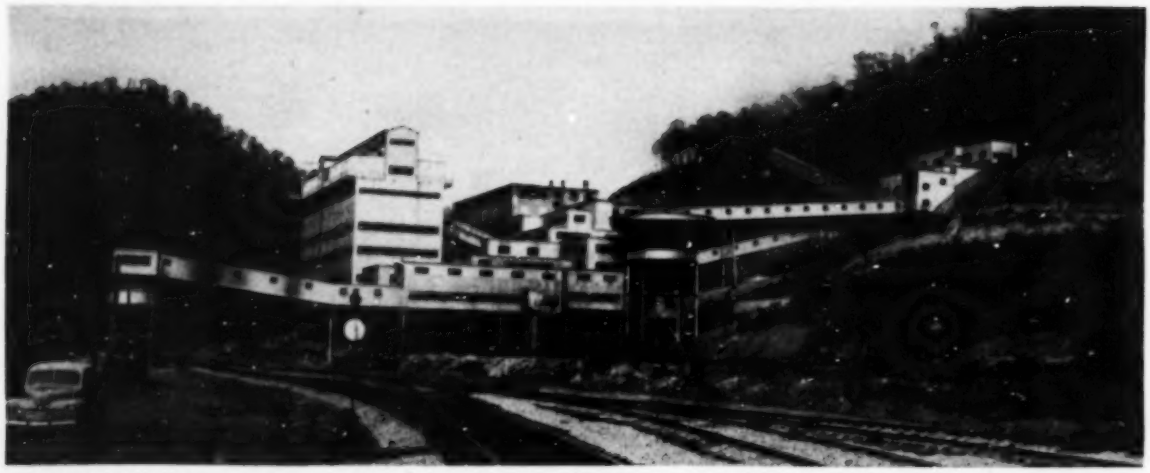
Rock Removed and Lump Broken to 7 In
7x3/16 Washed in Heavy-Media Equipment
3/16x0 Predried and Air Cleaned
Quality and Uniformity Stressed

By J. H. EDWARDS
Associate Editor, Coal Age

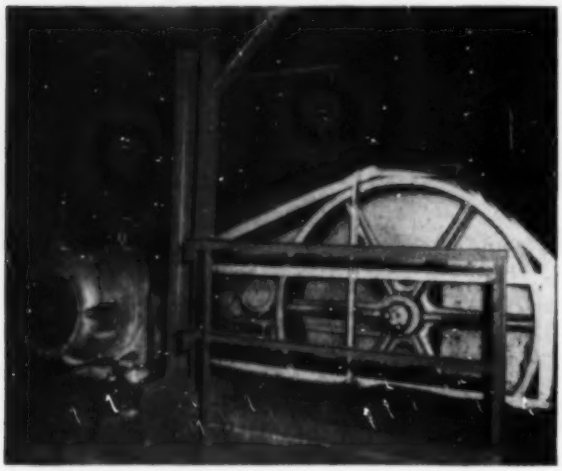
ADDING a potential output of 2,000,000 tons per year to the productive capacity for the "Original Pocahontas" coal produced by Pocahontas Fuel Co., Inc., now rated at 7,000,000 tons annually, the new 760-tph Itmann plant, at Itmann, W. Va., was timed to take advantage of the new developments that have come along in coal preparation. Plant design was deferred until these new developments could be proved by experience, which provided an opportunity for building a plant modern in all respects and specifically equipped to provide the maximum in quality and uniformity.

Pocahontas Fuel Co., Inc., began shipping low-volatile coal in 1883 and now operates eight preparation plants handling coal from the Pocahontas Nos. 3, 4 and 5 seams. The new Itmann plant began service Feb. 12, 1951, and features, among other new developments, picking out rock and breaking lump to 7 in., predrying and air cleaning $\frac{3}{16}$x0 and washing 7x$\frac{3}{16}$ in heavy-media equipment.

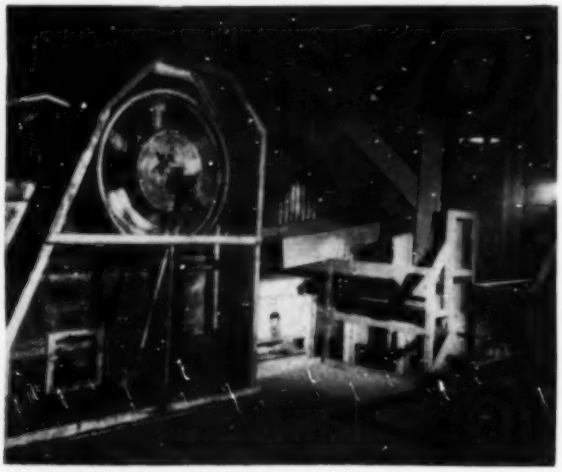
A. R. Matthews is president of Pocahontas Fuel Co., Inc., with offices at Pocahontas, Va. Other staff members are: A. V. Sproles, general superintendent; P. P. Ferretti, assistant general superintendent; J. W. Pero, production manager; W. J. Skewes, chief engineer, who directed the research and field studies leading to the general specifications for the new plant; A. E. Sadler, assistant chief engineer; J. W. Forman, preparation engineer; and, at Itmann, H.



ITMANN PLANT from the lower side. Air-cleaning plant (left) is in operation and the bag collectors are eliminating all signs of dust. Scalping and crushing are done in headhouse at right.



ROCK IS CRUSHED in this unit equipped with a fan-cooled motor and is moved by belt to truck hopper.



PICK BREAKER in headhouse (left) reduces lump coal to minus 7-in after picking.

VIBRATOR removes degradation from 3/4x3/16 on way to pre-wetting screen and float-sink unit behind.

FOUR MAGNETIC SEPARATORS like this recover magnetite for return to the heavy-media concentrators.

EACH MAGNETITE CIRCUIT at the Itmann plant also includes a densifier unit of this type.

A. Cassell, superintendent; R. J. Baugh, assistant superintendent; H. H. Morefield, general mine foreman; Guy Haynes, preparation foreman; and H. C. Hendricks, coal inspector.

COAL FOR 50 YEARS

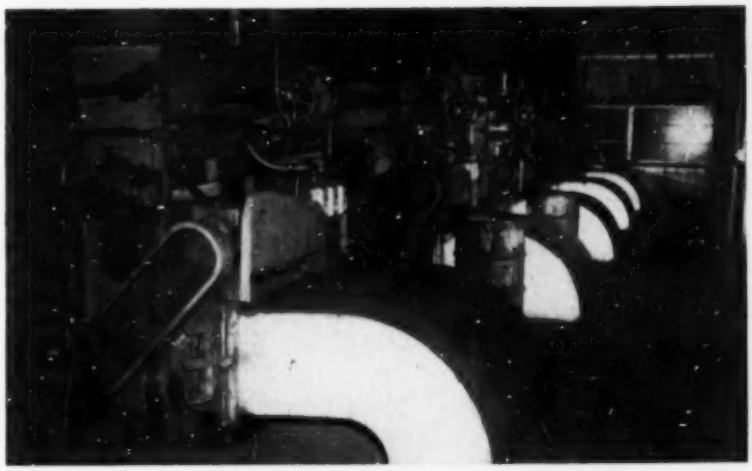
Production at Itmann colliery, situated on the Guyandotte River, in Wyoming County, West Virginia, about 3 mi from Mullens, comes from the Pocahontas No. 3 seam. The mine is on State Highway 10 and is served by the Virginian Ry. Sufficient tonnage is available for 50 yr of production. The seam is all above drainage and lies principally level. The main lease comprises two principal tracts divided by a narrow river valley over which, many years ago, the company built a steel bridge 155 ft high for a mine track connecting the two areas.

Although the coal is of premium quality, the 50-in seam includes one consistent parting and two come-and-go partings, consisting largely of bone and slate. All this material must be removed in the preparation plant. Top for the most part is slate and the bottom hard slate. The coal is very friable, low in volatile and sulphur, and has a high heating value. Industrial sizes go to metallurgical markets and the larger sizes to domestic uses in territories where smokeless coals bring a premium. The prepared sizes shipped are low in ash and moisture.

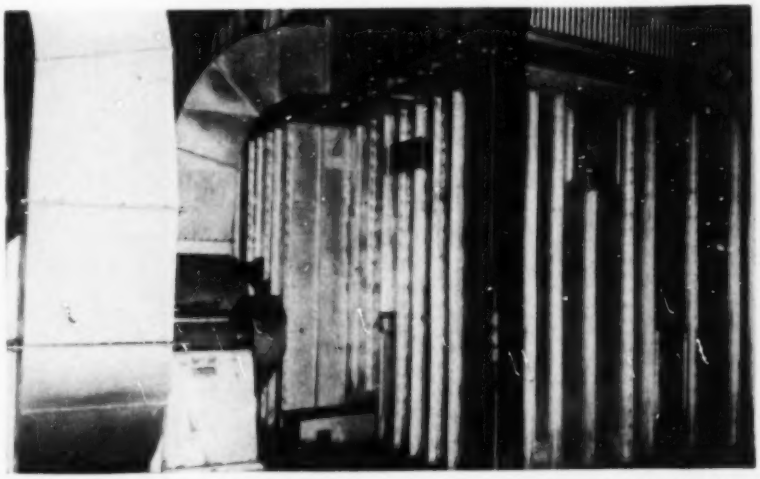
Preparation, as noted, consists of picking out the large rock, crushing the lump to 7 in, air cleaning 3/16x0 after predrying, and washing 7x3/16 in heavy-media vessels. Link-Belt Co. designed and built the run-of-mine handling equipment and the wet-washing and loading plant. Roberts & Schaefer Co. designed and built the air-cleaning plant, which is in a separate building and is the largest installation of Super-Airflow tables in the United States. Bag filters eliminate all signs of any dust from the exhaust stacks of the dry-cleaning plant. Over-all design of the preparation plant called for handling 760 tph of raw coal carrying 25% reject.

PREPARATION PRELIMINARIES

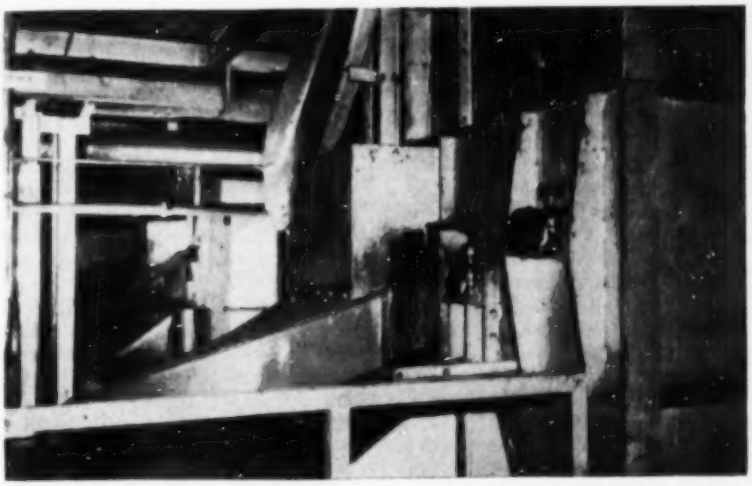
Solid-body Enterprise and Bethlehem mine cars carrying 5.5 tons are unloaded in a Link-Belt single-car rotary dump, which can be set to operate automatically or manually. The design calls for a maximum dumping speed of 180 cars per hour. The cars approach on level track and, from the dump, move onto a ½% downgrade which keeps the coupling links tight. A short hump is provided in the approach track immediately ahead of the Link-Belt chain feeder, to as-



TWENTY AIR-CLEANING TABLES clean and re-treat the 3/16x0. It is the largest installation of this-type tables in the United States.



TEN BAG-TYPE COLLECTORS capture all visible dust from the 20 air tables and dry-plant screens. The collected dust is added to final clean coal.

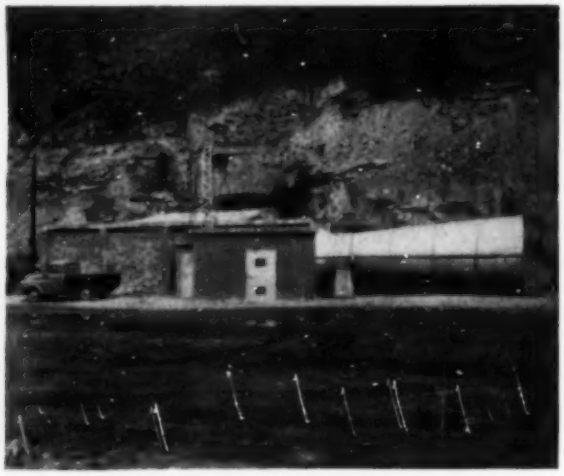


TWO OF THREE float-sink concentrators which clean coal over 3/16 in at Itmann and operate at different specific gravities.

LARGEST MOTOR in this 250-hp, 890-rpm unit driving the hammermill. The 290 plant motors total 4,400 hp.

TWO CABINET GROUPS control the air cleaning, with others in the wet plant and headhouse.

TWO TRUCKS, with a third as a spare, haul refuse to a dumping ground at mine level 1,500 ft from headhouse.



NEAR THE HAULAGE PORTAL, this 7-ft fan ventilates all mining on the left side of the Guyandotte River.

sure tight couplings. One man only, at the headhouse, handles the weighing and dumping. The car weights are used for determining plant input and for checking production from underground units.

Headhouse equipment includes a shaker screen, picking table, rock crusher and coal breaker. Minus 7-in coal from the Link-Belt stepped-screen shaker moves down the hill to the washing plant on a 48-in belt. Plus 7-in material passes over a shaking picking table having a baffle at the upper end to divert the flow along one side. Two men working on that one side push the larger pieces of rock out of the coal stream to the far side, which leads to the rock chute.

Rock from the table, after being reduced by a McLanahan & Stone rock crusher, is fed by an apron conveyor to a belt conveyor elevating refuse from the wet and dry plants to a truck-loading hopper at the mine track level. From here the refuse is hauled 1,500 ft in two Euclid Type 81-FD end-dump trucks rated 15 tons pay load and hauling 20 tons with side boards. The present dumping space is ample for several years. Another large area is available for future dumping.

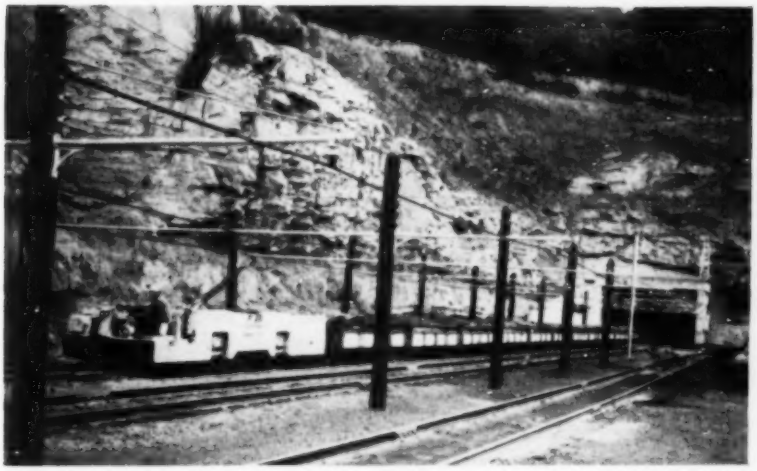
Plus 7-in coal over the headhouse shaker and picking table passes through a McNally Norton pick breaker and is reduced to minus 7 in before delivery to the 48-in belt moving it down to the main Link-Belt plant.

PREDRYING AND AIR CLEANING

In the washing plant the minus 7-in raw coal divides to two Link-Belt primary shakers which take out the ¾x0. This small size is then dried in a battery of four Link-Belt Multi-Louvre heat driers. The hot gases discharge to atmosphere through four Western Precipitation Corp. Multiclones.

The dried product is elevated to four 6x16-ft Link-Belt C-A vibrators which screen at ⅜ in. The ¾x⅜ goes back under the raw-coal primary shakers for sink-float cleaning in No. 1 vessel.

The ⅜x0 from the C-A vibrators is collected by a Link-Belt flight conveyor feeding to a belt carrying it to the adjacent building, which houses the air-cleaning plant. There a 60-in flight conveyor distributes the dried ⅜x0 raw coal to nine 20-ton surge bins. These surge bins supply an equal number of Roberts & Shaefer



MAIN HAULAGE at Itmann colliery utilizes three 20-ton locomotives. The mine is equipped with 800 solid-body cars rated at 5.5 tons.

Super-Airflow air tables for primary cleaning.

Each primary table has three draws. The first is "reject," the second is reject or middlings, and the third is middlings. At Itmann, as shown in the flowsheet, all reject products from all the air tables are combined with the crushed middlings from the heavy-media washer in a 50-ton bin and are loaded as steam-power fuel.

Middlings from the nine primary tables move onto an Aero-Vibe screen, from which the minus 10-mesh goes to the steam-coal bin. The $^{3}/_{16}$x10-mesh goes to a primary middlings table identical with the nine primary tables. Clean coal from this table goes to final clean coal, and rejects, as noted, to steam coal.

Clean coal from each of the nine primary tables goes to Aero-Vibe screens, one for each table, with 6-mesh cloth. Plus 6-mesh goes to final clean coal, while the minus 6-mesh is recleaned on nine secondary Super-Airflow tables. Table size is 6x12 ft. Each table has four draws. Material from the first goes to steam coal; from second, to middlings or steam coal; and from the third and fourth, to middlings. Clean coal goes to final clean coal. The middlings are screened at 28 mesh, the smaller size going to steam coal and the 6x28 to a separate Airflow table for final treatment. Clean coal from this table, the twentieth in the plant, goes to final clean coal. Reject goes to steam coal, and the middlings are recirculated.

Ten Pangborn bag-type dust collectors do a highly efficient job of collecting dust from the 10 air circuits, screens and other critical places in the plant. Each circuit includes a primary table, screen and secondary table. The dust from the Pangborn collectors—approximately minus 28-mesh—is added to final clean coal. The cleaned $^{3}/_{16}$x0 from this Roberts & Schaefer plant is combined with the $^{3}/_{8}$x$^{3}/_{16}$ clean coal from the heavy-media washer for loading a $^{3}/_{8}$x0 slack.

HEAVY-MEDIA SEPARATION

Three 12-ft Link-Belt No. 612 float-sink heavy-media concentrators wash 7x$^{3}/_{16}$ coal at Itmann. On its way to the vessel, the $^{3}/_{4}$x$^{3}/_{16}$ size is screened on a 6x10-ft Allis-Chalmers Low-Head vibrator to remove the $^{3}/_{16}$x0 degradation, and then is pre-wetted on a 6x16-ft vibrator of the same make and type. From this first vessel, operating at 1.40 specific gravity, the sink goes to refuse and the float to clean coal.

The 7x$^{3}/_{4}$-in fraction from the raw-coal shakers goes to No. 2 vessel, operating at 1.60. On its way, it passes over a 6x16-ft Low-Head vibrator. The first half of the vibrator removes the $^{3}/_{8}$x0 degradation and the second half pre-wets the coal.

Sink from the No. 2 vessel goes to refuse. The float is re-treated in Vessel No. 3 operating at 1.45 sp gr. The float from No. 3, after crossing a 4x16-ft double-deck Low-Head screen for draining and rinsing, goes to clean coal. Sink from No. 3, after draining and rinsing on a single-deck Low-Head, is crushed to minus 2-in and is moved to the 50-ton bin from which the steam fuel is loaded.

All washed clean coal moves out of the washery on a belt passing over a Merrick Weightometer. Readings of this belt scale furnish tonnage data for figuring royalties paid on the magnetic-separation process.

WATER HANDLING

Each magnetite circuit includes a Stearns magnetic separator and a Wemco densifier. Fine coal from degradation screens and other points in the wet-washing plant collects in a dirty water sump and is pumped to a Link-Belt dewatering screen of Simon-Carves type.

Water for the washing circuit is secured from a deep well close to the plant and is stored in a 300,000-gal tank. Before starting the plant each day some of the circulating water is drained off into a nearby sludge pond to reduce clay content. Overflow water from the plant also is fed into the sludge pond.

All principal pumps in the plant are Goyne. Rubber pipes are used for all main lines of the media circuits. Instead of conventional valves, such as gate or pinch type, for regulating flows containing solids, fixed orifices are employed. The orifice plate, which is plain steel, is easily changed if a different size hole is wanted. The plates are clamped between pipe flanges.

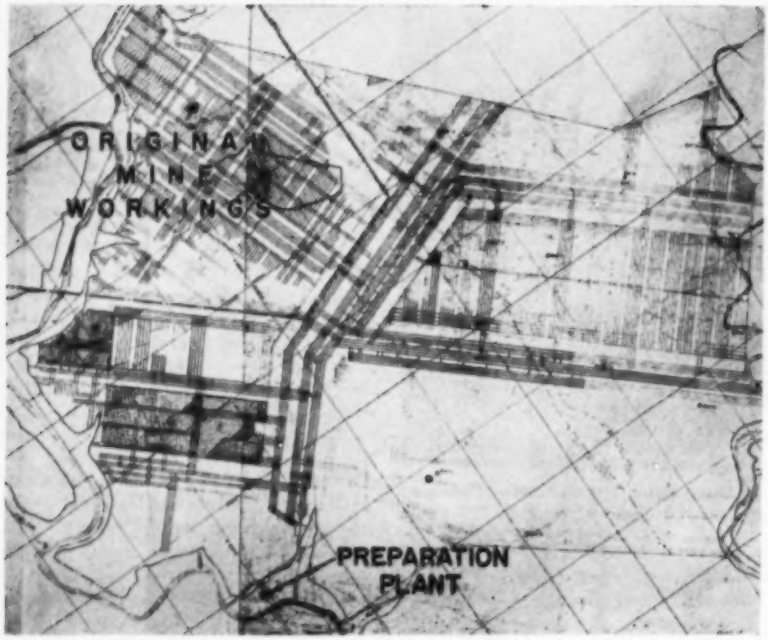
SIZING AND LOADING

Clean coal leaving the washery via the Weightometer-equipped belt goes to a Link-Belt clean-coal shaker consisting of three tandem all-steel screens. Here it is screened at $^{3}/_{8}$, 1, 1¾ and 3½ in.

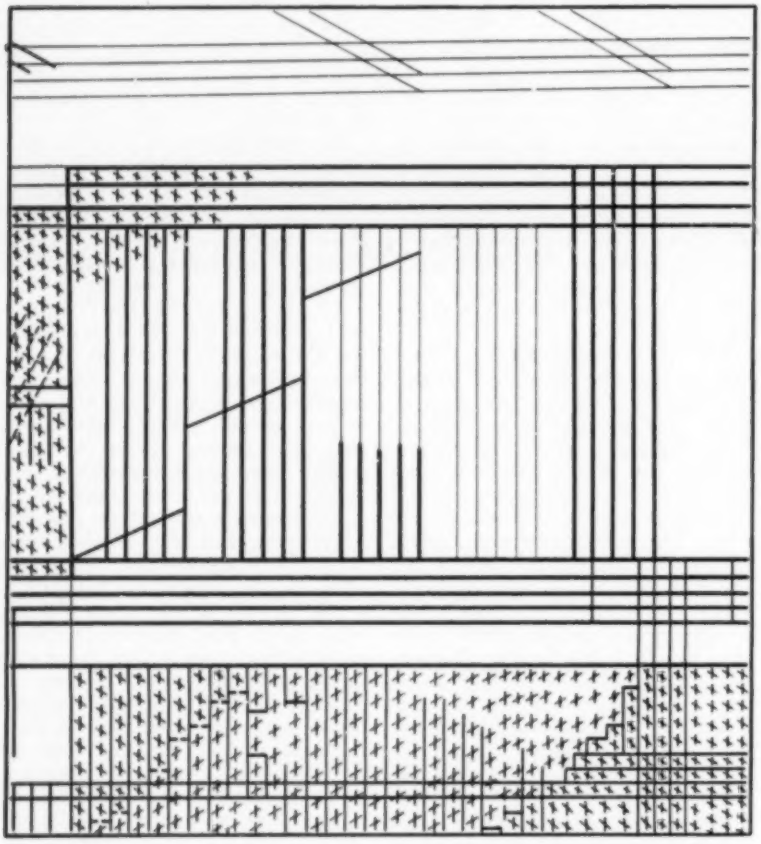
Any size combination can be loaded or diverted to a Pennsylvania hammermill crusher at the end of an auxiliary loading boom, termed "ROM Boom" on the flowsheet. The crusher discharges to a coal-loading chute. Of the six tracks, No. 1 is for egg (7x3½), No. 2, stove (3½x1¾); No. 3, household furnace (1¾x1); No. 4, pea (1x$^{3}/_{8}$); No. 5, slack ($^{3}/_{8}$x0). No. 6 track is under the auxiliary boom. A cover, the length of two railroad cars and with canvas curtains, houses the slack chute and the car being loaded to confine dust. All degradation is recirculated to the raw-coal shakers.

Equipment to oil-treat the coal for dust-allaying and freezeproofing consists of a needle-spray system developed by the Pocahontas Fuel Co.'s engineers and already proved at its other plants. Thirty-four needle sprays emanate from each nozzle. Wind loss is low and spraying can be done in the open. The oil is heated in winter but is used cold in summer. Oil storage capacity is 30,000 gal and the oil being used is "Permatreat," supplied by the Ashland Oil & Refining Co.

Itmann differs from the usual plant in the location of the car-loading controls. The operator sits in a tower between Tracks 3 and 4 and about 30 ft



ITMANN TRACT on the south side of the Guyandotte River. With property on hand, coal is available for 50 yr of operation.



MAP SECTION. Blocks 1,440 ft deep are mined in sets of five rooms between barriers, with pillar lines at 20 to 30 deg kept within 450 ft apart.

downgrade from the ends of the loading booms. From this excellent vantage point he gets a clear view for controlling the car-spotting, oil-treating and loading operations.

Brown-Fayro hoists for car spotting are installed in a compact group on a concrete base at one side of the tracks. Wire ropes pass over horizontal sheaves and under the rails to the hoists. Railroad-yard capacities are sufficient for 150 empties and 200 loads.

The heavy-media plant is heated by "Thermidaire" equipment installed by the E. K. Campbell Co., Kansas City. The furnace is coal-fired by a U. S. Machine Corp. Winkler stoker of the underfeed hopper type.

The two other furnaces in the plant, supplying hot flue gas to the four Link-Belt "Multi-Louvre" driers, have overfeed stokers with traveling grates, all made by Combustion Engineering. Fuel consists principally of 28-meshx0 dust from the Multiclone dust collectors. It is sweetened with enough ⅜ax0 middlings from the dry-cleaning plant to hold the flame during shutdowns.

There are 290 motors driving the plant and the connected horsepower is 4,400. All principal motors are General Electric 440-v totally-enclosed fan-cooled units. The largest, rated 250 hp, 890 rpm, drives the hammermill crusher.

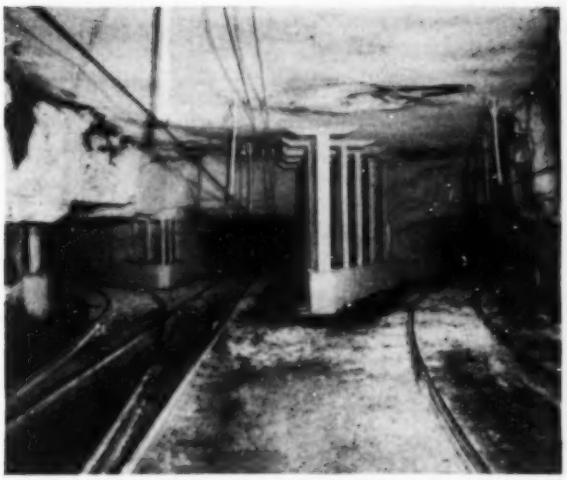
Starters, switches and breakers are grouped in General Electric "Cabinetrol" units in several control rooms in the plant. The upright-type control board mounted in the wet plant, from which most of the controlling is done, is also of General Electric manufacture. Motors are started by push buttons arranged in position sequence. Electrical interlocks and lockouts are provided.

MINING PLANT AND METHODS

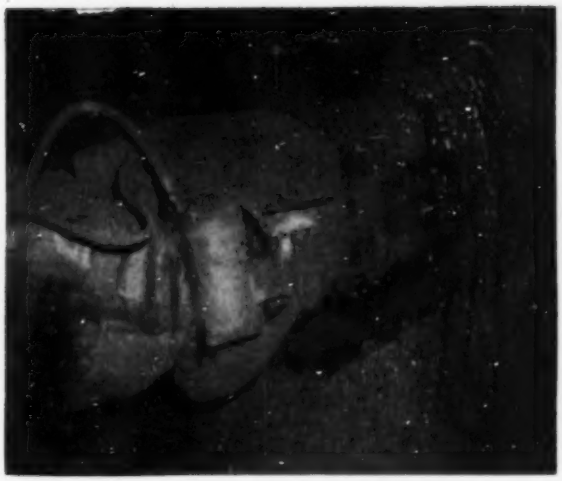
The mine portal is 1,200 ft from the headhouse and accommodates two haulage tracks. Height of the portal and of the main haulway is 12 ft, which is the height to which the top must be taken to reach a strong rock after the immediate roof is disturbed.

A modified system of block-and-panel mining with full recovery of pillars was devised for the mine. In blocks 1,440 ft deep and averaging 7,500 ft long, mining is done by driving sets of five rooms 16 to 18 ft wide on 75-ft centers, leaving barrier pillars on 150-ft centers between sets.

When the first set of five rooms has reached the limit, the second set is about three-fourths up and the third about one-fourth. The pillars of a set, including the barrier and the pillars



FROM 300 ft inside the portal. Track to left leads to motor barn; track to right is main-haulage runaround.



ONE UNIT is providing firsthand information on continuous mining possibilities at Itmann.

RUBBER-TIRED UNIVERSAL CUTTER has a 9-ft bar. Normal practice is to shear immediately left of center.

LOADING MACHINE discharging to a 4-ton shuttle car. Over most of the mine, natural conditions are excellent.

of the outby entry, are mined immediately on retreat from the set. Pillar lines are maintained at 20 to 30 deg and are timed so that the pillar lines of adjacent sets are within 450 ft of each other. The pillars are mined open-ended with caving about every second cut.

Wood timbering is used in production work and roof-bolting in the main entries.

Practically all the mining equipment was purchased new for Itmann colliery. The fan, located close to the haulage portal, is a Jeffrey 7-ft Aerodyne, now operated at low speed by a 50-hp General Electric motor and delivering 180,000 cfm at a 1-in water gage. The starter, also General Electric, is rated at 200 hp and will be big enough for the largest motor that will be required. An overcast 200 ft inby the portal and conducting the return air to the fan is 84 ft long. The intake airway under the overcast is 12x25 ft.

MINING EQUIPMENT

Major equipment used in mining at Itmann includes:

400 Enterprise solid-body mine cars, 4-wheel, 5.5 tons capacity.

400 Bethlehem solid-body mine cars, 4-wheel, 5.5 tons capacity.

3 Westinghouse 20-ton main-haulage locomotives equipped with MSA trolleyphones.

12 General Electric Type 831 cable-reel gathering locomotives, 8-ton, with single lever controls, equipped with MSA trolleyphones.

1 Joy continuous miner.

14 Joy 11-RU rubber-tired cutting machines with 9-ft bars, using Cincinnati chains and Cincinnati throw-away bits.

21 Chicago-Pneumatic 572 hand-held electric coal drills.

15 Joy 14-BU loaders.

28 Joy 6-SC shuttle cars (4-wheel drive and steer).

2 Joy 32-E shuttle cars (2-wheel drive and steer).

7 Joy elevators.

14 Joy spotting hoists.

2 Whaley No. 3 Automats for loading rock.

14 MSA Bantam rock dusters.

1 MSA track-mounted rock duster.

3 Joy track-mounted air compressors for rock drilling.

1 Ingersoll-Rand stationary air compressor.

RETURN AIR traveling to the fan passes over this overcast, 84 ft long with a cross-section of 300 sq ft.

SINGLE-LEVER CONTROL to prevent abuse is featured on the 12 8-ton cable-reel locomotives.

SAFETY CIRCUIT CENTER (left) and the high-pressure spray pump supplying the continuous miner.

OIL HOUSE is equipped with individual lockers. In the background is the Quonset-type car-repair shop.

1 Acme-Schramm stationary air compressor.

1 Joy jib-type drill.

1 Cleveland post drill.

13 Cleveland stopers and United Engineers dust collectors.

9 LaBour 2½-in self-priming centrifugal pumps.

The coal seam is generally level and only minor dips are encountered. That condition, plus good roof, hard bottom and location above drainage, little gas and little water, adds up to excellent mining conditions. Individual entry headings are driven 16 to 18 ft wide, the same as the rooms. Shearing immediately left of center is done in all development work but not in taking pillars. Coal is shot with Monobel C and the rock with du Pont Gelobel.

The continuous miner has been used only on development, and for the most part, the practice has been to serve it with two shuttle cars, one acting as storage. Spray water for the cutting head is supplied from core-drill test holes and is pressured by a 5-hp John Bean portable pump generating 400 psi.

Eighty-five-pound rail is used on the mains, 60-lb on the secondary haulage and 40-lb on the loading loops. Gage is 44 in and the main line is laid on 6x7-in creosoted ties. The haulage dispatcher's desk is at a vantage point in the mine-office building near the portal. Direct current at 275 v is supplied from outside substations having a total of four Allis-Chalmers 500-kw rectifiers. DC is fed into the mine through boreholes and the main portal.

For the next 3 or 4 yr mining will be confined to the side of the valley on which the plant is located. On the left part of the tract pillars will continue to be taken as development progresses. In the right-hand part, a middle area 2,800 ft wide is being robbed on advance to the boundary and the areas on each side will be mined and robbed on retreat from the boundary. A very high recovery is being achieved.

The Itmann plant is now up to a two-shift capacity of 11,000 tons of raw material per day.

Quotables

Don't forget that your wife still enjoys candy and flowers. Let her know that you remember—speak of them occasionally.

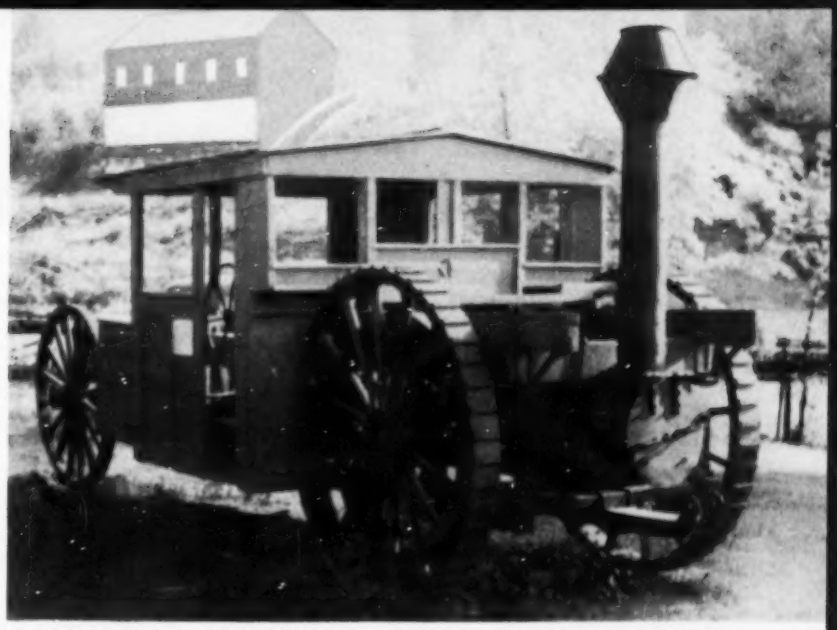
The candidate who campaigned by promising to serve the people is kind of like the fellow who said: "I didn't want to marry her for her money, but I didn't know any other way to get it."

You can still get a drink for a dime in Pittsburgh, according to a recent coroner's report.

The worst thing about the younger generation is when you are no longer considered one of them.

Granddaddy Tractor

By MARTIN A. MARSCHANG
Bethlehem, Pa.



YESTERDAY'S "STEAM WAGON," a granddaddy of today's tractor, was built near anthracite region in 1888, hauled logs and picnickers.

THE MODERN TRACTOR, which over a comparatively short period of years has moved into coal mining and displaced horse-power on the majority of farms in the United States, is not too modern at that.

One of the first tractors used in this country was built in 1888 by the late David Spencer, of Pleasant Mount, Pa., on the fringe of the anthracite region.

The new machine was powered by anthracite, though wood also could be used. It was—and is—another in anthracite's long list of contributions to the early industrial development of the Nation. Recently the "Steam Wagon," as it was known, was renovated and repainted. It now is on public display in Honesdale, Pa.

The story of David Spencer's ambition to build the tractor comes from the records of the Wayne County Historical Society, Honesdale. He conceived his plan at the Centennial Exposition in Philadelphia in 1876, where steam-driven machinery from England was on display. During the following 2 yr he started his plans to build what he called "a steam-propelled road wagon that could be used for hauling heavy loads on the highway."

About 1880, Spencer started accumulating the various parts for building his road wagon. Because the design was novel, it took him several years of searching to find all the parts he needed. Assembly also required considerable time but with the help of Frank Spencer, David's brother, who was a blacksmith, the wagon finally was completed in December, 1888. The boiler was mounted as in a locomotive except that the stack was placed at the rear.

The new tractor was given its first road test in December, 1888. Over 6 mo later, on July 4, 1889, it was demonstrated to several hundred church people picnicking at Pleasant Mount. Many of the young people at the picnic took rides on a wagon pulled by the tractor.

For the rest of its life, the tractor was used mostly for hauling logs around the Spencer mill yard. Occasionally, it provided power for threshing oats. But the high cost of building it—in the neighborhood of $10,000—prevented further commercial development by Spencer.

In 1947 the old steam wagon was turned over to the Wayne County Historical Society as a memorial to the inventor, who had died in 1944 at the age of 89. But before he died, Spencer had the satisfaction of seeing the idea on which he worked grow into the efficient modern tractors and bulldozers that are used so extensively in anthracite and bituminous strip-mining today.

Shelf Speeds Up Lamp Watering

THERE'S ALWAYS more than one way to do any job. That's what Willie L. Marty, lampman at the Wharton No. 2 mine, Coal Div., Eastern Gas & Fuel Associates, Barrett, W. Va., figured when he devised this simple method of adding water to miners' lamps in the lamphouse racks. It saves him time and makes the watering job much easier.

Previously, Mr. Marty used to lift each lamp out of the rack and take it to the bench to add water. Now, he takes the bench to the rack. Inserting two steel pins into the side of the lamp rack and resting a board across them as shown in the photo, he then pulls each lamp out onto the "bench," waters it and slides it back into place. The caplamp stays hooked in place in the rack. Mr. Marty, a graduate of the School of Applied Art, of Battle Creek, Mich., has been with the Coal Div. for 15 yr and also does sign painting at Wharton No. 2.

Keeping Safety Up-to-Date

Can safety techniques stay abreast of today's advances in mining machines and methods?

A company safety director says "Yes"—and gives some practical pointers on how to gear safety procedures and training to modern operating conditions.

By W. H. BENNETT, Safety Director

Midvale Mine, Columbia-Southern Chemical Corp., Midvale, Ohio

ELIMINATING MINE DISASTERS and reducing to a minimum the injuries sustained in coal mines now has become the major goal of progressive mining men.

The human suffering and misery resulting from mining tragedies has brought the sobering realization that decisive remedial action must be taken to limit both the frequency and the severity of mine accidents. Thinking men of all groups connected with the mining industry have recognized that much improvement in the safety record can yet be made and that this improvement must be brought about by sane, constructive dealing with the primary causes of accidents.

Just as there are no miraculous formulas that can supersede careful planning and vigorous application in mining production, so the road to actual safety achievement must be paved with constructive thinking, energetic initiative and common-sense precautions.

Intelligent planning, coordinated action and hard work will produce results in any field of endeavor. Safety is no exception. The safety program should not be allowed to vegetate but should be kept abreast of every development and change in mining plans, equipment or physical condition.

Many coal mines operate over long periods of time with no major accidents and few minor ones. Large expenditures are made and utmost precautions are taken to eliminate hazards and sources of injury to employees. Within these mines work thousands of miners who, by careful adherence to safe work practices, rarely suffer an injury. This high degree of safety is achieved when unsafe conditions and practices are eliminated and safe work habits are thoroughly established.

I cannot go into all phases of mine-safety problems and their respective solutions and therefore will confine myself to some practical observations on some pertinent and highly important items. Some aspects of these items naturally interlock or are connected with certain elements in other aspects. But this fact does not change the over-all picture.

Controlling Mine Roof

The ominous toll taken by falls of roof and coal should focus special attention and study upon means whereby everyone engaged in mining operations may be afforded maximum protection from this hazard.

Roof conditions vary so widely that complete reliance upon one set standard of timbering in all mines is not to be encouraged. A timbering program meeting the needs of one mine may be totally inadequate for the requirements of another mine. The following ideas should be of value in reducing accidents from this source:

1. Require all operating officials of a mine to study carefully the roof conditions at that mine. The roof characteristics of the seam should be learned, with special attention to local variations and deviations. The geologic formations and structure of the seam also should be learned.

2. Use sound judgment and careful thought in the choice of a timbering plan. Remember that the timbering standard applies to general conditions and that local areas may need additional timbering. Enforce the timbering plan. Since most roof-fall accidents occur at or near the working face, this is a "must."

3. Make certain that roof and ribs are examined regularly and properly. When any work must be done in old or abandoned workings or when a place works through into old standing entries or areas, extreme caution should be exercised to make absolutely certain that the roof in this area is timbered safely. This timbering is an absolute necessity when removing stoppings that have been in service for some time because, especially in old entries, the timbers may have decayed and the stopping may be supporting rock that will fall when the stopping is removed.

4. Note changes in planes or texture of roof and coal and give instructions accordingly.

5. Study the effect on roof of various mining methods, blasting and other operations.

6. Anticipate timbering needs. Never be short of needed timbers.

7. Keep working faces in alignment to avoid unusual strata stress.

8. Instruct every new employee about hazards likely to be encountered. Reactivate the minds of all employees to this hazard regularly. The instruction given new employees and others regarding roof hazards should be given by a prominent, competent official of the company and should not be left as a routine duty for a section foreman.

9. Study accident cases. Formulate plans to prevent similar occurrences.

10. Keep abreast of new methods and equipment. Support of roof by means of roof-suspension bolting has gained wide prominence in the industry. This method of roof support is successful in many mines. But certain precautions should be observed if success from this method is expected. Not all roof can be safely bolted. Wide, extended areas should not be supported by roof bolts alone. A knowledge of the geologic formation should be an integral part of any roof-bolting program, Indiscriminate bolting, without regard to the geologic formation, is not recommended. Consultation with roof-control specialists will establish the best method or program for successful roof bolting.

More and Better Ventilation

Ventilation is a subject more or less familiar to all mining men. Yet, more than a few times, neglect of common-sense ventilation fundamentals has resulted in a disaster.

More than any other item, ample, uninterrupted ventilation is THE positive preventive of gas ignitions and explosions, because an accumulation of gas cannot occur if adequate ventilation is provided. Sometimes the mining plan interferes with or prevents perfect ventilation. Naturally, the ventilation program should be fully comprehended in the mining plan and a safety factor over and above the volume of air required should be provided.

Return Airways—It is extremely doubtful that any large mine workings now are planned without provision for ample return airway area. Many of these return airways, however, are blocked by falls of roof or accumulations of water and thus their intended service is nullified. In entries intended for main return airways, bleeders and other functions, the roof should be supported by treated timbers or by use of suspension roof bolts to prevent cave-ins. Entries driven for airways should not be driven too wide. If more area is needed, more entries should be driven. If the mine is wet, provision should be made to drain or otherwise remove the water from dips where water accumulations would block air travel.

Bleeder Entries—Some mining men believe that bleeder entries are a fallacy and that they are of no value. Others maintain that they are of proven worth in maintaining desired areas free of gas accumulations. The value of bleeder entries lies in their being maintained free of obstructions with periodic checks to make certain they are functioning as planned. Gassy mines should have bleeder entries.

Air-Volume Checks—A "must" in today's ventilation of a mechanically operated mine is a constant check on the volume of air in each split. A portion of a mine may be provided with sufficient splits for ventilation, efficiency and safety, with an ample volume of air for the splits, yet it may develop a serious condition within a remarkably short time. For example: Several butt or room entries are on retreat and a series of butts and mains are being advanced. The use of modern mining equipment permits advances of 100 ft or more in 24 hr. As a result of this rapid advance, resistance is added rapidly with a consequent lessening of the volume of air, whereas the entries on retreat have a lessened resistance and an increased volume. In a very short time, the ventilation in the advancing entries could deteriorate to such an extent that a disaster potential could develop. Unceasing vigilance is necessary in this phase of ventilation. A constant check on the volume of air circulating through the working faces is necessary in rapid advancement in gassy areas.

Precautions in Gassy Mines—A ventilation plan admirably adapted for use in a non-gassy mine may be totally unsuited to a gassy mine. In gassy mines, all worked-out areas should be sealed or ventilated into bleeders so that it will be impossible for a roof fall or other disturbance to force gas into active workings. Periodic checks should be made of the bleeders to make certain they are functioning properly. In no case should live workings be ventilated with air from worked-out areas known to liberate methane.

Rooms in Series—Ventilation of a series of rooms should be so arranged that when a room is driven or cut through into the previous series of rooms, the direction of air travel will be from the active rooms toward the worked-out rooms. Since most gas ignitions are a result of ventilation failure or interruption that affects the working faces, strong effort should be expended to insure an adequate, uninterrupted movement of air at all times in these areas. Because mechanical mining advances the faces rapidly, ventilation controls must keep pace. A stated minimum required quantity of air at the working faces should be an integral part of every mining plan. This minimum quantity should be of sufficient volume to provide a safety factor above the normal requirements.

Overcasts—Overcasts should be used wherever practicable. Doors used to direct ventilation in highly gaseous areas should be equipped with a signal device to give warning if the door is left open. If possible, all doors should be standardized as to size. If an extra door is kept ready, replacement of a torn-down door will take only a few minutes.

Oxygen Requirements—It is difficult to conceive of a mine today being so poorly ventilated that the oxygen content of the air could be below 20%. If this condition should develop and if methane should be present, the chances of detecting the methane would be remote, because a flame safety lamp loses between 25 and 30% of its heat and illuminating power when the oxygen content of the mine air is 20%. Any smaller quantity of oxygen in the mine air causes a correspondingly greater loss of heat and illuminating power of the flame safety lamp and thus diminishes the probability of detection.

Blasting with Safety

Accidents from explosives have been greatly reduced but some practices could be improved or changed to achieve a still greater reduction.

Many severe injuries, even fatalities, have resulted from no warning or insufficient warning being given when shots were being fired in places being driven abreast. In many instances, especially in mechanical mining, a very thin pillar is left between places, with the result that shots can shoot or blow through into the adjoining place. Under these circumstances, distances

and widths should be checked constantly and, when shots are to be fired, any person or persons working in adjoining places should be removed.

Open, under-burdened, over-burdened or improperly stemmed shots, or a series of shots fired in rapid sequence, could open the door to disaster.

The safest method of blasting a coal face has been a matter of much discussion. Different seams and different mining methods present a complexity of blasting problems but observance of known safe blasting practices will be a safeguard under the various mining conditions encountered at different operations.

The type of agent used to break down the coal, together with the mining plan used and the physical characteristics of the seam being mined, will help determine the safety practices to be followed. Recommendations by the U. S. Bureau of Mines for safe blasting are generally comprehensive.

Preventing and Fighting Fires

Control of mine fires is largely a job of prevention plus adequate facilities to cope with an emergency if it should arise. The old adage, "An ounce of prevention is worth a pound of cure," is fully true in this matter. Workmanlike installation of equipment and machinery with good housekeeping in operational methods will greatly minimize the fire hazard and, if a fire should occur, it can be brought under control more quickly and with less danger.

There is no question concerning the desirability of fire-prevention measures. All will agree that preventive measures have highest priority. But since fires can occur from unforeseen sources, preparation also should be made to contain or extinguish a fire quickly. Minutes count in bringing a mine fire under control or extinguishing it.

Haulage Belts—Since belt haulage has become a large factor in mining and because several fires have originated from this source, safeguards concerning belts and related items will be mentioned first.

Obviously, the introduction of belts of non-flammable material will be a tremendous forward step in reducing the fire hazard. Work has been progressing rapidly on this project and limited quantities of non-flammable belt now are available.

The records show that most belt fires have been generated by friction. Some, however, have resulted from adjacent power-cable failure. The focal points where care must be exercised to prevent belt fires are the loading and discharge points, drive-head, tail pulley and power cables. Insufficient tension on the belt will cause slippage at the belt drive, thus causing fire from friction. Fouling of the belt by coal spillage at loading or discharge points, gob, supplies and other items have the same effect. If debris is allowed to accumulate around the tail pulley, a fire can be generated there. It is an assured fact that proper belt installation and good housekeeping really hit pay dirt in prevention of fires.

Slip switches, when properly maintained, are of proven merit. If the belt fouls and stops while the drive motor is operating normally, the slip switch shuts off the current to the drive motor. Paddle switches should be used at each transfer point to stop the belt in case of excess spillage at these points. These are important precautions in preventing fires from belt slippage.

Cables and Controls—All power cables should be of sufficient size to carry the required load without overheating. Power cables, trolley wire, feeder cables and other conductors installed in belt entries should be on the opposite side of the entry from the belt. Cable sheathing should be of fire-resistant material so that a cable fire will go out as soon as the current is cut off. Splices should be carefully made and adequately insulated. Bad splices and overheating of cables because of insufficient size are common causes of fire in cables. False-current trippers or safety circuit centers have proved to be of great benefit in preventing cable fires, because they de-energize the cable the moment a short circuit occurs.

Most up-to-date, progressive mines have instituted some very commendable measures to prevent fires and to aid in retarding the spread of fires. Extra-heavy rock-dust applications on entries where trolley and bare power wires are hung lessen the fire hazard should the wire be forced down. Fuse or circuit-breaker protection on power lines to pumps in remote areas, rock-dust and fire extinguishers at or near possible sources of fire, and removal of flammable material such as oily waste and other debris to the outside —these are general safe practices.

Water Connections — Worthwhile additions to the foregoing procedures include water, among other things. Since water never has been superseded by any other agent in fire-fighting effectiveness and since it usually is available in pipe lines, either for removal or allaying of coal dust, the installation of suitable connections to make water immediately available at regular intervals along a line is of tremendous value in speeding effective fire-fighting operations. Hose, fittings, proper nozzles and other equipment should be strategically stored ready for instant use.

Breathing Equipment — Adequate respiratory equipment should be provided at the mine. This equipment should be inspected regularly to make certain it is in operating condition. A group of select, dependable men should be kept trained in the use of the equipment.

Entries—For safety in getting out and for proficiency and ease of operations in containing and extinguishing a mine fire, room entries as well as mains should be driven in sets of three or more. If a fire occurs where this mining system is followed, the work of bringing it under control is simplified because ventilation can be well controlled. The main air current can be made to by-pass the fire, leaving only the exact quantity wanted to pass over the fire to clear away smoke and fumes.

This plan is especially well suited to belt haulage. If the belt and power cables are installed on a middle entry, neutral as to air travel, and if a fire should break out, the workmen have a positively safe way to escape and the ventilation can be so arranged that fire-fighting can be begun from either side of the fire. A change to the other side of the fire can be effected in a few minutes. The advantages to be gained by this system can be seen easily.

Rock Dust—Since all dry parts of a mine are required to be rock-dusted, there is not much to be said on this subject. Extra precaution should be exercised around shaft and slope bottoms where structural roof support is a familiar scene. Float dust from dumping of coal, haulage and other operations can gather in unthought-of quantities on this overhead support

while the track and surrounding areas may be well rock-dusted. A small fall could dislodge enough dust from overhead to precipitate a disaster if a trolley wire, feeder line, power wire or any other source of an arc is present. The quantity of coal dust necessary to propagate an explosion has been estimated at 3 oz per lineal foot of a 10x6-ft entry. This would be equal to 3 oz per cubic foot of any area, or 1 oz for 20 cubic feet. Many times this quantity can gather easily on overhead structural support.

A rock-dust machine, maintained in operating condition with needed accessories, hose, electrical connections and a supply of rock dust, should be stationed at a strategic point in the mine where it will be instantly available. The machine should be placed on a separate spur—not parked on a utility siding behind a string of miscellaneous mine cars.

Making Haulage Safer

Haulage accidents have been practically eliminated in many mines by careful adherence to well-known haulage safety rules. Good installation and upkeep of track, proper maintenance of rolling stock, adequate clearance space, improved communication facilities and the requirement that trips make a full stop before anyone gets on or off and before couplings are made—all these have contributed to the improved record in haulage. Compliance with the established safety regulations for track haulage will result in fewer accidents at any mine.

Shuttle-car operators should face direction of travel at all times when the shuttle car is traveling. This should be mandatory in view of the great number of operators killed while sitting with the back in the direction of travel.

Ribs should be maintained free of overhangs and posts should be kept in alignment. Failure to follow these procedures accounts for the majority of injuries to shuttle-car operators.

Another danger spot for "buggy" operators is check-curtain installations. Here buggies have collided and, in several instances in thin seams, operators have suffered broken necks or other severe injuries from the overhead board or framework to which the brattice cloth was fastened. To achieve safety at this point, a transparent material has been successfully used for a check curtain. Swinging doors that open either way and swing back to a closed position have eliminated the hazard from overhead framework or board while still fulfilling the ventilation requirements.

Safety Rules and Training

Man does not have an instinctive sense of danger. His faculties must be developed and his working habits supervised until he will use precaution or follow a known course of safety if a hazard or danger is encountered. Some men can learn quickly the safe method of performing an operation but others need often-repeated instruction to achieve like results. Individual employee contact with injuries and accidents is too painful and costly to experience or contemplate, but each individual engaged in mining should be made acquainted with the underlying causes of these unfortunate occurrences and the way to avoid them.

Although there has been some antipathy toward compliance with safety rules, progressive mining companies have recognized that safety rules have added immeasurably to the safety record and therefore have incorporated them in their mining program. By means of safety rules they have endeavored to acquaint workmen with the hazards incident to their occupation and the ways to avoid injury from these hazards.

The three "E's" of safety—Engineering, Education and Enforcement—must be integrated and adhered to if progress in safety is expected.

There are two features in connection with safety rules in which much improvement could be shown, as follows:

1. Many safety rules are obsolete, referring to operations of a past era and to ancient mining plans in which changes were few and far between. Many mines have been modernized and mechanized but the existing safety rules never have been revised to meet the changed needs. The introduction of new types and more units of mining machinery has brought different types of hazards. Each type of mining machinery requires individually suited rules in addition to the general comprehensive mine rules. From research, experience and sound judgment, management can initiate and effect measures to safeguard the lives and health of employees.

2. The induction of new employees often leaves much to be desired in the way of safety indoctrination. The new employee usually is handed a copy of the general safety rules and is requested to read them. Later, a perfunctory inquiry is made to find out whether he has read them. This routine is hardly conducive to best results. A designated competent official should go over each rule with the new employee, acquainting him with the meaning of the rules and their intent and pointing out the best way to avoid injury from any work he may be assigned to.

Safety rules form a basis for safety education, but in this rapidly advancing age further education is necessary if the maximum of safety is to be obtained. This does not signify acceptance of unsound, unproved theories or restrictions. It does mean the marshaling of facts concerning the causes of injuries, fatalities and disasters and the presentation of these facts in graphic, understandable form to all men engaged in mining operations.

Classes in job-hazard analysis could be used with great success in reducing injuries. This approach to accident prevention is sound, constructive and of real merit. It creates active and cooperative employee interest in accident prevention while activating the mind of employees to the hazards incident to their individual occupations. This active employee participation and awareness of hazards must be secured if best results are to be obtained.

Initiative, foresight, planned effort and vigorous application are required to achieve and maintain full protection. The same elemental factors must activate the safety program if it is to be successful. The reports of progress in safety are gratifying but continuous, unabated effort must be expended if the utmost in safety is to be achieved.

Pumping more than 6 billion gal of water to date to release coal for deep stripping is the latest achievement of J. Robert Bazley, Inc., engineers. Choosing effective methods and applying new water-handling materials provide a big assist. Here's how they go about the job of . . .

STRIPPING PROGRESS **SEPTEMBER, 1952**—Initial cut along north side provides working place above water level while lake in background is being

Moving a Lake to Work a

By HAROLD DAVIS
Associate Editor, Coal Age

STRIPPING ANTHRACITE from deep basins is "old stuff" to the engineers and equipment operators of J. Robert Bazley, Inc., Port Carbon, Pa., but moving a lake to get at the coal is something new. In their newest project at Morea, Pa., for Weston Dodson & Co., Inc., Bazley engineers faced the problem of lowering the level of a lake, estimated to contain 2½ billion gal, as their adjacent stripping deepened. Actually, the Morea pumps in their first year, ending April 30, 1953, had handled about 6 billion gal, even though large flumes had been built to divert surface runoff from the lake.

The story of how the water is handled and how the coal is recovered contains good lessons in setting up stripping methods and searching out new tools and materials to help in solving the problems.

SPECIALLY DESIGNED RUBBER PIPE is used in suction and discharge lines to provide flexibility for faster setups.

LAY OF THE LAND

The veins being stripped are the Mammoth, Skidmore, Seven Foot and Buck Mountain, from top to bottom, and the coal lies in a reservation pillar which was left in earlier deep mining to support railroad tracks, mine openings and surface installations at Morea colliery.

At the place to be stripped, the basin is about 400 ft wide at the surface and the coal extends about 900 ft along the basin axis, the width of the reservation pillar. When the job is finished, the deepest portion of the pit will be about 300 ft below the original surface.

Estimates indicate that during the course of the work, about 2,800,000 cu yd of rock and clay will be removed to recover the ¾ million tons of coal in the basin.

Preliminary work included relocation of the railroad track, power lines and water flumes, and removal of a portion of a breaker waste dump over the area to be stripped.

Thicknesses and inclination of the veins are shown in the accompanying typical cross section.

HANDLING THE WATER

Virtually all the coal lies below the original water level of the lake which

pumped out. Churn drills prepare a second cut in overburden through center of pit.

JUNE, 1953—Four 4,000-gpm pumps, connected through a manifold to a 24-in discharge line, have reduced the lake to a fraction of its original size. Water surface is kept 35 ft below drilling level.

Strip Mine

SEPTEMBER, 1953—Going deeper month by month, the pit floor now is about 130 ft below the original surface. Controlled pumping made it possible.

was at an elevation of 1,401 ft above sea level. The lake occupied old strippings which had been worked up to the reservation-pillar boundary by other operators.

The water-handling problem is double-barreled: (1) Lower the level of the lake in a controlled manner by pumping as the new strip pit goes deeper and (2) divert surface runoff as much as possible through the use of flumes.

The first approach to lowering the level of the water, 260 ft deep at some places, was through the use of a 13,000-gpm centrifugal pump, 40-ft head, driven by a 125-hp motor. The reason for employing this unit was to pump the upper portion of the body of water with a low-head pump and resultant reduced horsepower.

A temporary diversion flume made of treated paper was installed to carry runoff to the outlet channel of the lake. This unusual flume was made of sheets of Panelyte, a product of the St. Regis Paper Co., which consists of sheets of kraft paper bound in phenolic resin. Flat sheets, 30x72x 1/16 in, were bowed into shape on the job and held in this position by steel-strap cross braces. After caulking the joints and supporting the sides of the flume with dirt and gravel, the "paper" flume was ready to carry water.

The big advantage was in the high speed with which the long flume could be assembled. Later it was replaced by a permanent wood flume.

On the pumping angle, it was recognized from the beginning that the 13,000 gpm unit was a temporary measure to be pursued only until sinking pumps could be fitted out to follow the water level as it receded, thus keeping the length of suction lines to a minimum.

The new setup includes four Barret-Haentjens 4,000-gpm (425-ft head) centrifugal pumps equipped with thrust bearings and otherwise designed for operation at any angle to eliminate the need for leveling the pumps as they are lowered to follow the receding water line. The employment of multiple units insures constant pumping capacity even though one or more of the units is under repair or being moved. Furthermore, a measure of control over the rate of water removal is provided. The plan is to keep the water level about 35 ft below the floor of the active bench in the strippings to permit drilling and blasting of the next level in water-free area. This will also permit adequate getaway time for the million dollars' worth of equipment in the pit in the event the water begins to rise against the ability of the pumps to remove it.

The four 10-in units are driven by individual 500-hp General Electric

STRIPPING SHOVELS, with 8-cu yd (left) and 4-cu yd buckets, load spoil into 15-cu yd rear-dump trucks. Overburden preparation is a job for three churn drills and a rotary drill, which provide blastholes from 14 to 17 ft apart.

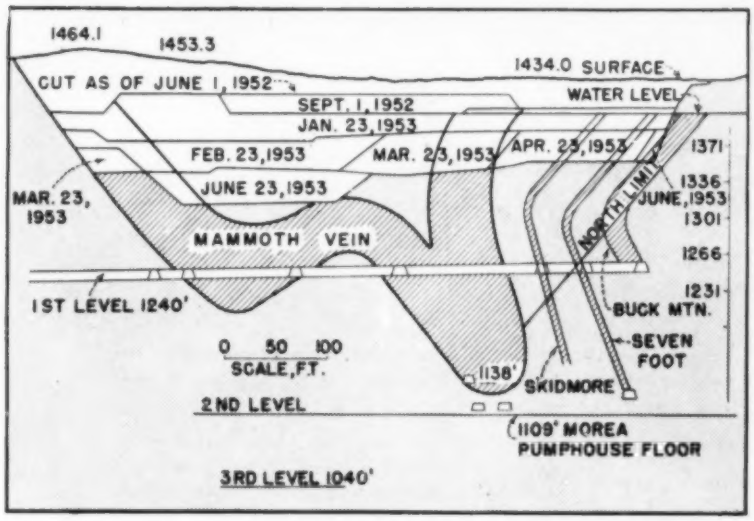
TEMPORARY FLUME was made of sheets of resin-bound kraft paper.

PERMANENT 900-FT DIVERSION FLUME carries away surface runoff.

LAKE DRAINAGE was started with this 13,000-gpm unit.

SHOP-MADE MANIFOLD couples the four pumps to the 24-in discharge line which is anchored to the ground.

THINNER-VEIN COAL meets production quotas while the job of uncovering the 60-ft Mammoth vein takes priority.



BOTTOM OF THE MOREA BASIN is almost 300 ft below the natural water level. Pumping will continue until the job is completed.

motors connected for fully-automatic sequence starting to prevent undue shocks in the discharge line.

MOVING THE PUMPS

The ramp along which the pumps are lowered is the haulage road out of the old strip pit. As the water recedes the ramp is repaired and regraded to permit movement of the pumps. The main discharge line is made of 24-in Transite pipe fed through a built-up manifold which receives the individual 12-in discharge lines of the four pumps. As shown in the accompanying illustration, the manifold is a 3-piece assembly designed to permit replacement of parts without lengthy interruptions in pumping. Covers are provided to seal off the end of the tee if either side of the manifold must be removed.

Two manifolds are available, thus permitting scheduled rebuilding of the interiors in Bazley's Port Carbon shops to counteract the corrosive action of the water which has a pH of 3.4. The manifold sections are built up inside by welding, then coated with Roskote.

Still another new material, specially-designed rubber pipe, is used in the suction lines and in some portions of the individual discharge lines between the pumps and the manifold, both applications requiring some degree of flexibility in the lines to eliminate the need for elaborate preparation in resetting the pumps after a move. Supplied by B. F. Goodrich Co., the 14-in suction pipe is made to withstand 125 psi, and the 12-in discharge pipe, 300 psi.

Other refinements in the pumping system include a priming pump, check valves in the individual discharge lines with relays to stop the pumps when the valves close, and concrete-and-chain anchorages for the main 24-in discharge line as it lies in a ditch in the ramp.

As a final precaution, the company continually checks the water levels in the underground workings of Morea and New Boston collieries, neighboring properties in the same basin. This is done to prevent surprises, since the condition of the barrier between the two deep mines cannot be ascertained.

RECOVERING THE COAL

Morea is strictly a truck-and-shovel operation. Later on, however, the coal in the lowest part of the Mammoth basin may be hoisted out by dragline. The new 8-yd Bucyrus-Erie 190-B stripping shovel is fully convertible for use as a dragline merely by changing the front and the rigging. The power units in the shovel are designed to permit such interchange.

Overburden is removed in 30-ft benches, and spoil is hauled up pit ramps and dumped into the dwindling lake area by a fleet of ten 15-yd Euclid trucks. The first ramp was laid out to rise along one side of the adjoining worked-out basin while newer ramps are built along the toe of the spoil bank to limit haulage grades as the pit deepens.

Drilling is done by three Bucyrus-Erie 42-T churn drills, diesel-powered, and one Joy Heavyweight Champion rotary drill. Holes are drilled on from 14- to 17-ft centers, both ways, and are charged with American Cyanamid 40% quarry gelatin. Primacord is placed throughout the length of each hole to insure thorough detonation, and holes are detonated electrically with a 25-millesecond delay between rows.

Loading the coal from thinner veins which have been uncovered in the progress of the work is a job for two smaller Bucyrus-Erie shovels, a 10-B and a 20-B. Coal is hauled out of the pit in 10-ton Ford trucks, the number of trucks depending upon the coal movement schedule.

Stripping now is done by the 190-B, which features a two-section boom with a trussed lower section for better digging, and a P&H Model 1400. Stripping is a 3-shift operation, five days a week. The 190-B, after a few months of service, is producing about 8,000 cu yd per day, (21¾ hr).

PLANNING THE WORK

The pit was opened along the north side of the basin to provide some early coal from the Buck Mountain vein and to straighten up the surface in preparation for the big job to come. Previously, the outcrops of the Mammoth seam had been stripped.

As shown in the cross section, the North Limit of the job is projected to cut off the thinner veins at the place where the pitch reverses. This is a safety precaution designed to eliminate a dangerous highwall condition that would result if further mining of the thin veins was attempted. While the present emphasis is on the job of uncovering the Mammoth vein in the basin, the Buck Mountain coal is being loaded out and stockpiled if necessary. Otherwise, it might be stranded on the highwall at a height that would make later recovery difficult.

Successive cuts from 75 to 100 ft wide are removed parallel to the axis of the basin in lifting the 30-ft benches. This width provides room for trucks on both sides of the shovel, which shuttles back and forth as necessary to remove the blasted material.

Power for the electrified pit equipment is stepped down from 66,000 v to 2,300 v in a substation equipped with two 1,500-kva transformers. Routine maintenance is done in a field shop at the pit, with bigger jobs going to the central shops at Port Carbon.

James R. Bazley, vice president, and H. H. Hughes, general superintendent of the Bazley organization, are in charge of the project. Henry Ludwig, electrical engineer, supervises the pumping procedures in addition to his other duties. George Thomas is project engineer for the Weston Coal Co., and Peter Canto and M. L. Lovelick are stripping foremen.

The Reader AUDITED PAID CIRCULATION ABC *His Mark*

THE ABC that appears in the symbol at the top of this page stands for Audit Bureau of Circulations. The symbol itself is an emblem of cooperation, in which every subscriber to this magazine has an interest.

The Audit Bureau of Circulations is a voluntary, non-profit, cooperative association. It was founded in 1914 and now consists of 3450 advertisers, advertising agencies and publishers in the United States and Canada. This magazine is proud to be a member.

ABC originally was set up to help take the racket out of publishing, to eliminate the waste and guesswork then so prevalent in publishing and advertising, to establish order and confidence in place of the misunderstanding and misrepresentation that arose from unverified circulation claims and dubious circulation practices. Its mission was to protect the interests of both readers and advertisers.

THIS IT DID by first defining the term "paid circulation." Then it established standards and rules to govern subscription sales practices and records. Finally it set up an auditing organization to verify the claims and report the facts concerning the circulation of each member publication. It now maintains on that job a working staff of sixty-five full-time auditors. So the ABC symbol has become the hallmark of circulation standards and advertising values. Each member publication must maintain those standards if it wishes to retain its membership and display the ABC symbol.

This ABC audit is no perfunctory affair. When a business publication, such as this one, becomes a member of the Bureau, it agrees that the auditors shall have "the right of access to all books and records." Their inspection, therefore, may cover any part of its operations. Original subscription orders, payments from subscribers, paper purchases, postal receipts, arrears of payments, and many more items are painstakingly checked by the auditors. In many instances they go behind the records to seek verification from subscribers themselves as to the terms of their subscriptions.

IN DOING ITS JOB, ABC has created many values for both publishers and readers as well as for advertisers. That is because the publication that becomes a member of ABC thereby offers the strongest possible guarantee of its primary devotion to the interests of its readers. The function of a business magazine is to be useful to its readers. When this service is rendered by an ABC publication, it is constantly subject to the practical test of reader acceptance and approval. As each subscriber has the right to purchase or refrain from purchasing an ABC publication, that collective right confers upon the readers the power to say whether or not the publication will survive. Thus the report on its ABC audit provides the most direct assurance that a publication stays in business only because of a voluntary demand by readers who find its editorial service responsive to their needs.

Naturally, the editor of each business publication follows closely the score thus racked up by his paper in its ABC reports. In the scope and tone of his editorial coverage and treatment, in the selection and presentation of his editorial content, he must constantly labor to maintain and enhance the readers' acceptance of his efforts. That is why the editorial standards established by ABC publications set the editorial standards for all publishing. That is how the ABC constantly stimulates its member publications to become even more useful to their readers.

AND THAT IS WHY the ABC symbol has become the Mark of the Reader, a constant reminder that his willingness to pay for an ABC publication is the acid test of its value both to him and to its advertisers.

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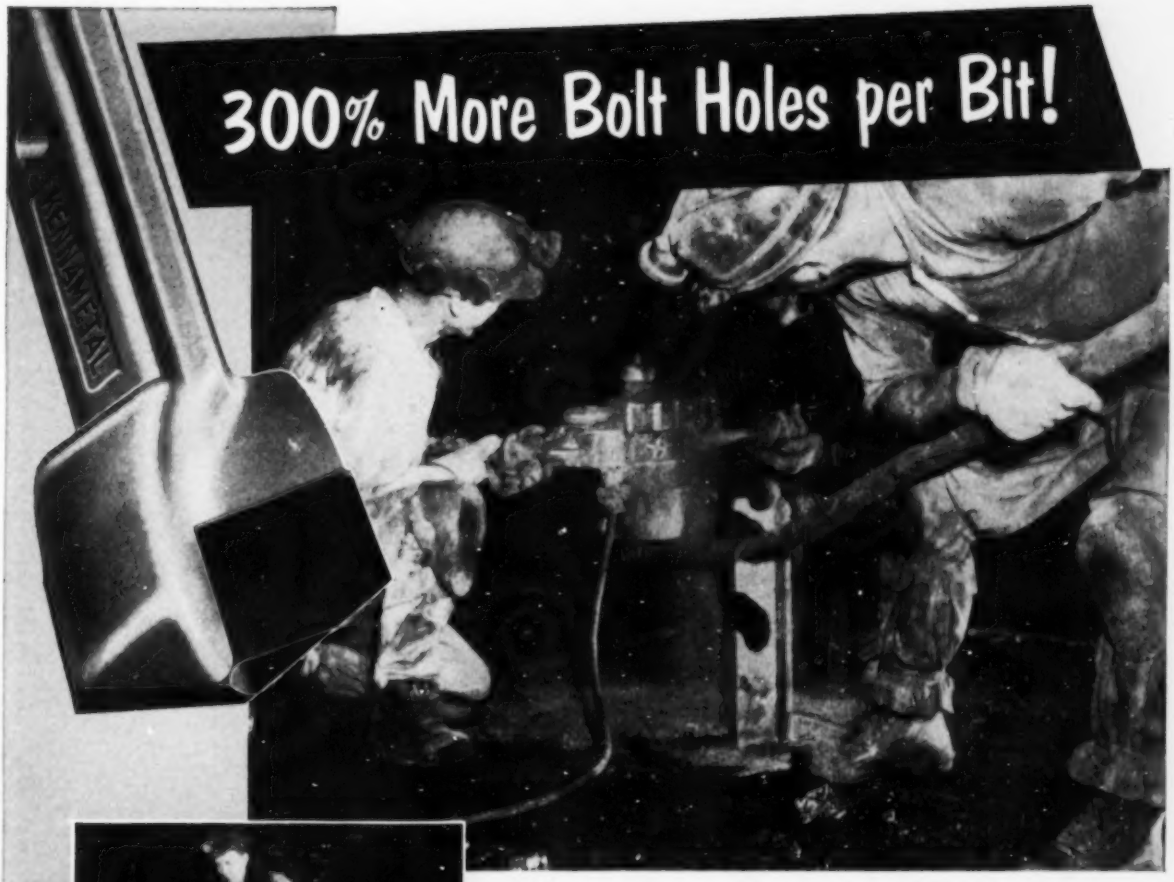
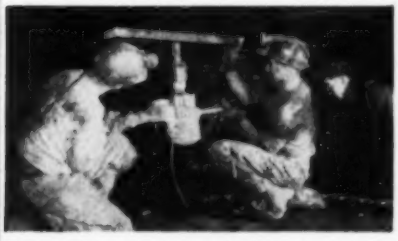


Simple roof drilling rig consists of cap or pan (for holding drill) mounted at end of double-strength steel bar which is used as lever in notches of steel fulcrum. As bit penetrates roof, lever is raised to next notch.



By applying Kennametal Sintered Carbide Rotary Bits in this operation, the mine is able to drill and bolt with the same equipment. Drill is also fitted with Kennametal Bits and used at the face for blast holes.

Leechburg Mining Company's Park-Armstrong Mine uses Kennametal Sintered Carbide Bits to get substantially lower costs for roof drilling in its 32-inch seam. Hard, tough Kennametal Bits average *fourteen* 2-foot holes per sharpening—*over three times* as many as other carbide bits could drill!

Until Kennametal was used, it was impractical to rotary drill this roof. Now, a simple rig has been devised so that drillers can readily install longer drill rods to keep pace with drilling speeds.

Kennametal Sintered Carbide Bits can reduce costs in ordinary conditions and solve drilling and cutting problems where conditions are severe because (1) Kennametal has shock- and wear-resistance superior to any other tungsten carbide and (2) Kennametal Representatives—veteran mining men with years of actual mining experience—go into the mine to demonstrate the right bit for the job.

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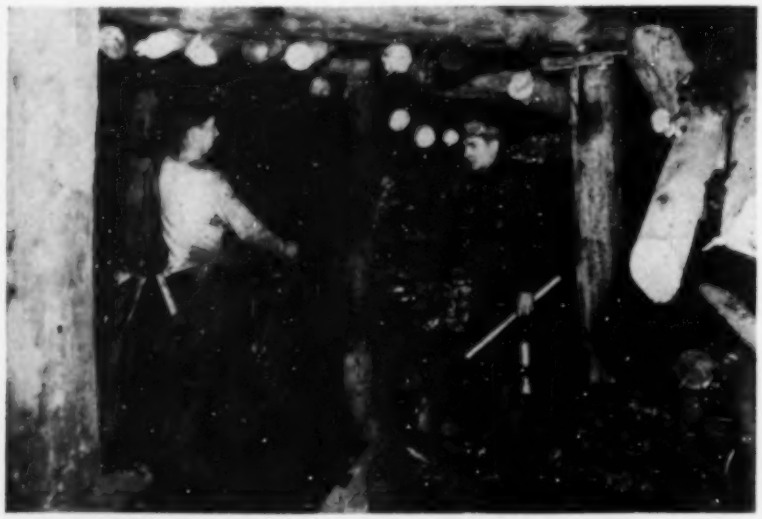
Foremen's Forum



YOU CAN COVER yourself and your men by working hard to head off accidents . . . **LEARN** all you can, then teach them all you know . . . **YOU CAN'T** supervise the mine, you can supervise only the men and yourself . . .

How Not To Be "It"

The responsibility for mine accidents is being pin-pointed right down to the man. You don't want to be "It." Here's why and how.

THERE EXISTS a ticklish subject affecting foremen which merits discussion, so let's discuss it. It concerns the matter of publishing in public documents a statement assigning responsibility for mine fatalities after a thorough investigation of each such accident has been made. Quite often the responsibility is placed wholly or in part right smack on the shoulders of supervisors or managers.

It's too late now to object to the publication of such statements, even if any of us were inclined to do so. Apparently, all pros and cons in the matter were carefully weighed before this seemingly drastic course of action was adopted. As a result, the assignment of responsibility for mine fatalities now is an established condition of life in mining, and supervisors will have to learn to live with it.

In facing up to the fact, the foreman can choose between two alternatives, as follows:

1. He can let things ride and hope that if there is a serious injury or worse, he will escape being tagged with part if not all of the responsibility.

2. He can take positive steps to see that he is never "It" by accepting a prior responsibility—the responsibility for seeing to it that there are no accidents.

AVOIDING THE TAG

The right approach to this new problem of avoiding being tagged "It" is not covering up, erasing evidence or making excuses after the accident. Rather it is taking steps in advance to make sure nobody tries to tag you. How? By inspecting each working place you visit as though you were dead certain an accident would occur in that place that very day.

This means checking the installed timbers or roof bolts for compliance with your standard roof-support plan for example. It means viewing the status of the work at the time of your visit and leaving very specific instructions for handling unusual conditions. And once in a while, make a second, unannounced visit to such places.

Don't visit your working places on a rigid, stopwatch schedule day after day. Break up the routine so that in a period of several days you will have a picture of what goes on at different places during different periods of the day. By so doing, you will be able to pinpoint undesirable work habits and to take corrective measures. If the men expect you at a certain time, they'll be on their best behavior. You know that.

Make a point of reading the published accounts of how fatalities occurred, then guard against similar hazards and conditions. No mine or section is permanently immunized against such hazards.

Watch one of your men for 5 min some day, and as you watch imagine some of the things that could possibly happen to him. This is a morbid practice, we grant, but it will certainly prevent any droops in your interest in safety.

Avoiding the tag, therefore, is not a criminal attempt to becloud an investigation. It can become a humane pursuit that will eliminate investigations by preventing the accidents which call for them.

GUARDING YOUR OWN SECTION

Since responsibility and accountability are to be traced down to the individual man or supervisor, if possible, it appears that in matters of mine safety it is "every man for himself." On the surface it might appear that the "brother's keeper" concept of safety no longer applies. The truth of the matter, however, is that while every man must look out for himself, he still is his brother's keeper, because he might conceivably be declared responsible for the accident that happens to either.

You can resolve that if accidents must

"The officials, whose first duty is safety of the men, are responsible. . . ."

"Officials of the mining company, who created and tolerated a hazard, must be held responsible. . . ."

"The foreman did not have a known bad-roof condition corrected."

"The foreman visited the place just before the accident occurred but did not examine the roof."

—"Responsibility" statements from state and federal reports.

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a "Fairmont-Built" plant is your best coal salesman

There is nothing quite so important to the successful selling of any product as uniform quality. It builds confidence among the buyers and gives added incentive to the salesman to push his product with assurance.

Fairmont-Built plants have proven their ability to deliver a uniform, premium coal which will always meet the test of car-to-car analysis.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

Designers and Constructors of Complete Coal Preparation Plants Using Both Wet and Dry Cleaning, Centrifugal and Thermal Drying

happen, let them happen somewhere else, not in your mine or section. This isn't a selfish attitude if everyone adopts it. Furthermore, you are not relieved of the responsibility of co-operating with others in promoting safety for the industry. If you have a talent for expressing your safety ideas, you should not hesitate in doing so. Be prepared to discuss safety with others who have similar responsibilities. Study the safety aspects of your job. Learn as much as you can from anyone you speak to.

But the crux of the matter is this: Your own mine or section is your first responsibility. No one else can effectively discharge the supervisory duties which will promote safety in your own working places.

CONDITIONING THE MIND

Accident prevention can be a state of mind. A conscientious concern for the safety of men seems to be built into good supervisors. They work at it day by day rather than in sporadic campaigns. These bosses know the secrets of avoiding the tag, and you could hardly call them underhanded. You see, we are not showing you ways and means of wiggling off the hook; our only purpose in bringing up this subject is to show that responsibility for accidents can be avoided only if a prior-responsibility for their prevention is accepted. The proper time to cover yourself and avoid the tag is before the ugly accidents happen.

There is more to it than sticking close to the timbering plan. Top management can contribute by setting up safe methods for recovering coal under existing conditions. Good engineering, the application of all present knowledge and the enthusiastic backing of the safety effort are included in top management's share of the accident-prevention mission.

It is good to note that the industry is making commendable safety strides, but the publications distributed by state and federal safety agencies still contain statements like these:

- **Permanent crossbars** were not spragged to prevent their being knocked out of position.
- **Roof-bolting** plan was not strictly followed.
- **Management** allowed the place to be driven too wide.
- **Employees** did not replace post knocked out by a machine.
- **Employees** removed roof supports to allow free movement of equipment.
- **The accident** was caused by an interruption in the ventilating current.

PULLING THE RIGHT STRINGS

Such pointed statements can be reduced in number in future publications if foremen condition themselves to the habit of pulling the right strings. This, too, sounds like a shady practice, but it isn't. It means giving the right orders at the right time to maintain safe working places.

It boils down to this. In going about your duties, be certain to observe mining laws to the letter and don't fail to support the spirit of the law. One of your best tools is mine law. Don't limit its effectiveness by taking liberties with it, and don't permit others to play fast and loose with it.

Pulling the right strings also means ordering corrective measures on the spot when you see hazardous conditions. Roof support should not be neglected while other jobs are cleaned up, not even for a few minutes. Bad roof is impatient.

You might think of it this way: You don't supervise either the mine conditions nor the physical structure—you can only supervise yourself and the men in handling the conditions and structure safely. Above all, stifle the habit of taking up tools and barging into the job yourself. The records show that foremen have injured themselves or others by muscling in on a job. That's pulling the wrong strings.

KNOWING THE RIGHT PEOPLE

Shallow characters think they can reach any goal merely by knowing someone who has the power to bestow upon them rewards which others must work for. This method of achieving one's desires is called "knowing the right people."

But there's another meaning in knowing the right people. The right people for the safety-minded foreman to know are the men who work for him. You can head off accidents to a respectable degree by knowing how careful or how careless your men can be. In some instances, there is a Jekyll-Hyde twist that changes a careful man at 9 o'clock in the morning into a careless fellow at 2 o'clock in the afternoon. Other fellows are prone to lose their tempers with inanimate objects such as stubborn posts or balky machines. These are common human failings, but they do contribute to accidents. Since your job is to supervise people, you must try in the interest of safety to overcome such shortcomings.

Finally, knowing the right people, the men who work for you, will arouse your concern for their peace of mind. Having covered yourself and pulled the right strings to avoid the tag, you will be moved to help them do the same. In that direction lies safety progress.

A Discourse on a Supposition

By KARL T. MILLER, Safety Engineer
The Hudson Coal Co., Scranton, Pa.

AT AN EARLY BREAKFAST one gloomy morning the wife of a mine foreman, who had been denied a new dress, was bawling him out for something he had done or should have done, or something he said or should have said. This naturally made him angry so to restore his self esteem, when he got to work, he bawled out a section foreman for something he had done or didn't do.

The mine foreman, then feeling better, settled back to start the day's work, but the section foreman, feeling mad, went into the mines and looked around for someone to vent his feelings upon. The first one he came to was a miner in a chamber and he proceeded to bawl him out for something he had done or didn't do. The section foreman, now feeling better, walked out of the place whistling.

Now the miner was mad so he started to take it out on the laborer for something he had done or didn't do. The miner then felt so good he started to hum a merry tune, but the laborer was now mad at the world in general and in walking back to the car was looking for a rat to kick to relieve his feelings. As the mine was working slack time there were no rats around so he started the shaker chute and, while thinking up nasty things to tell the miner, a big chunk of coal came off the end of the chute and mashed his finger.

Now—how would we prevent an injury of this description

A. Chip in and buy the wife a new dress?

B. Get a subscription for comic books for the mine foreman?

C. Hire a humorist to get the section foreman in a happy state of mind before starting the day's work?

D. Install radios in each place to render soft music for the miner?

E. Get steel gloves for the laborer?

F. Remind each one of them that they have a specific job to do and that the thoughts, talks and actions of each have a definite chain reaction upon the others.

G. When we have reached maturity we should have developed a character that should enable us to disregard the minor irritations of our daily routine and concentrate our thoughts upon the particular job which we are doing. It can be done, and the natural law of self-preservation should be sufficient to do it without using others as doormats on whom to trample to establish our self esteem.

The injury and chain of events leading up to it are fiction, but there is also realism connected with it which you can prove by thinking over the injuries which occurred to you, particularly what you were thinking about the moment before you were hurt.

If you can honestly say that you were taking all safety precautions, had your mind on the particular job you were doing and that despite all these things it occurred, then it was an accident; otherwise we can only prevent injuries by correcting the faults within ourselves.

—Reprinted from
The Safety Commentator

WANT TO TAKE A DARE?

Here's a challenge to any owner of any competitive machine.

Your Caterpillar Dealer will demonstrate any Caterpillar-built machine against any competitive unit . . . and he'll do it on your job.

He'll do it—not with a chip on his shoulder—but to show you that a Caterpillar-built machine will do your job better, with more production in less time and for a longer period without down time that costs you money in time and repairs.

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If you've never used Caterpillar equipment on your job our dare gives you a chance to compare the working ability of Cat machines with others.

Take the dare . . . get a demonstration . . . any way you look at it, you'll be the winner.

Call your Caterpillar Dealer and say, "Yes, I'll take your dare." Tell him where and when. He'll do the rest.

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Operating Ideas

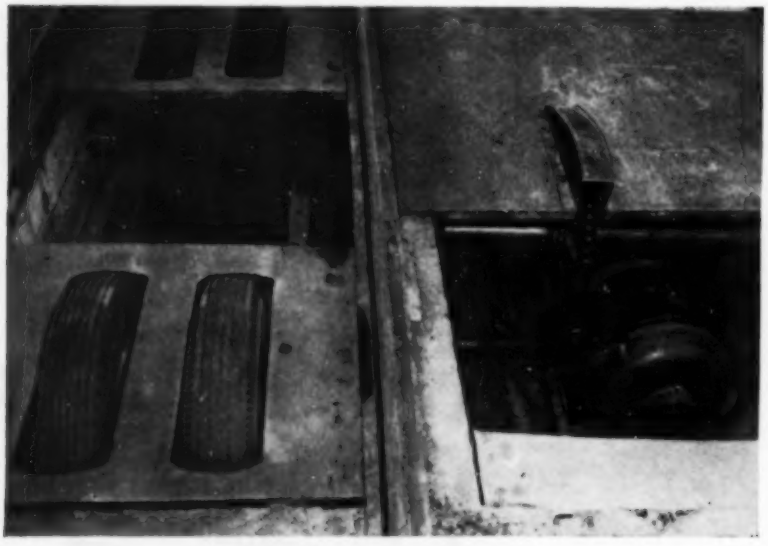
Shuttle-Car Cabs Rebuilt for Driver's Safety

SHUTTLE-CAR OPERATORS in the Hendrix mine, Consolidation Coal Co. (Ky.), Deane, Letcher County, Ky., now have safer jobs as a result of revisions made in the cabs. Every conceivable change has been made to provide for safer operation in the 42-in seam.

As shown in the two views of the same cab above, a lattice of heavy steel was attached to guard the front. Deck width was extended several inches to form a side guard and a hand hold was placed on this deck extension so that the operator can more safely lean out as necessary in sections of lowest coal. This added protection is important in keeping him from being bounced out of his seat or against the roof. The wider seat and hand hold are boons to a shuttle-car operator in low coal particularly, as he has to keep low and lean out to see.

Sunnyside Uses Auto Tires to Propel Mine Cars

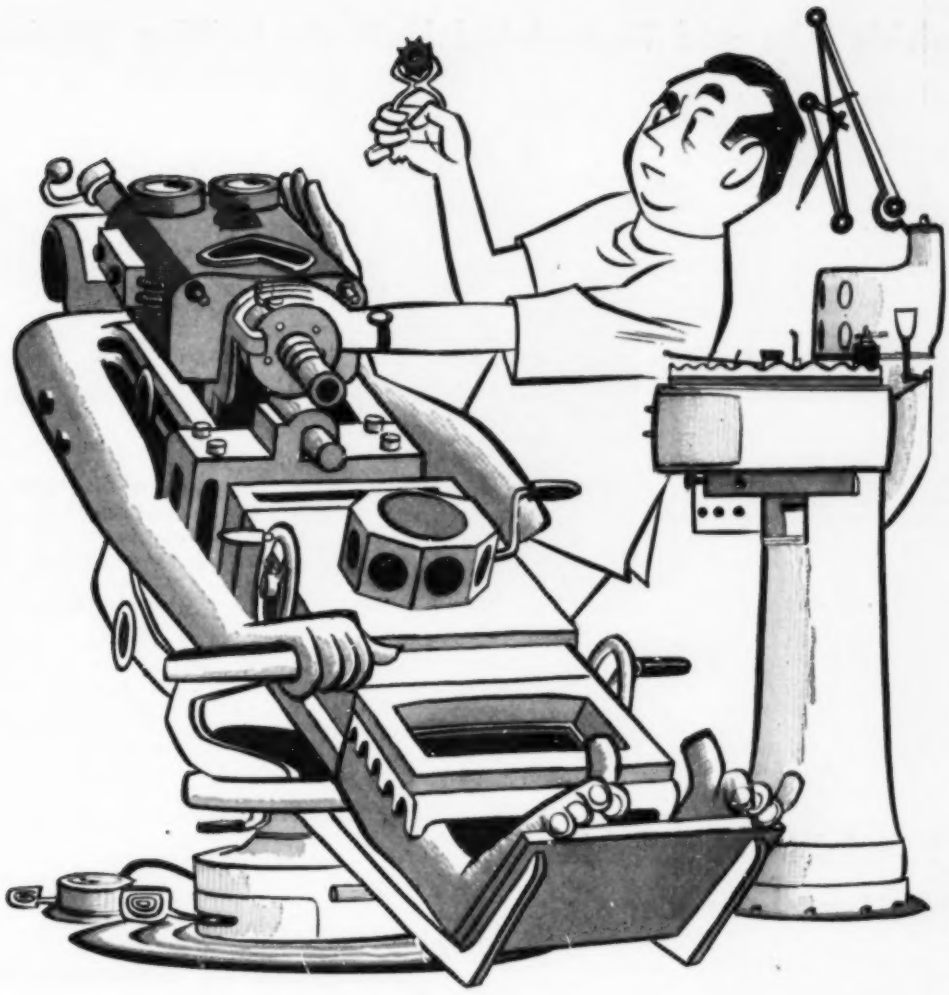
TWO CAR MOVERS, designed by Lee Alger, master mechanic, Sunnyside mines, Kaiser Steel Corp., Sunnyside, Utah, employ power-driven automobile wheels and tires in moving trips of loads into the rotary dump and in handling trips of empty cars on the sidings below the dump. The units which are set under the tracks at each end of the dump replace the part time use of a yard locomotive heretofore used in handling supplies and making up trips for the main haulage locomotives.



Each unit consists of four 6:00 x 16-in tires mounted in a bed which may be raised and lowered on hydraulic jacks. When the bed is raised, the tires engage the bottom of a car and as power is applied to rotate the tires, the car above the device and other cars coupled to it are moved to or fro. A motor and gear reducer operate through a chain drive to turn the tires.

The new car movers permit the main line locomotive to make faster turn around time. After cutting off a trip of loads it can quickly pick up a trip of empties which the yard mover has positioned near the entrance to the empty-car siding. A conventional-type car haul at the entrance to the rotary dump, which feeds the preparation plant, handles the movement of the loads through the dump. Both of the newly devised car movers are controlled by the rotary-dump operator from his control station, where he governs the actions of the hydraulic jacks and drive motors.

The tires now in use are equipped with sawdust-filled treads, and other types will be tested to determine the best ones for the application.



It hurts twice as much today!

Double reason why you need Correct Lubrication!

Look up some of your bills for machine repairs during the last so-called "normal" year. *You'll be surprised!* The ring gear that cost you $83 to replace in 1939 now costs $165. A thrust bearing that cost $44.35 now runs $88.73. A millwright's hourly rate in 1939 was 70¢. Now it is $1.56 per hour.

Yes, it sure hurts twice as much today to pay for machine maintenance—*double* reason why you need a program of Correct Lubrication! Such a program assures your use of the right oil or grease for every part of every machine . . . thus steps up machine efficiency—keeps repairs and downtime to an absolute minimum.

Why not get a program of Correct Lubrication started in *your* plant? Call your Socony-Vacuum representative!

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
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Correct Lubrication

First step in cutting costs!

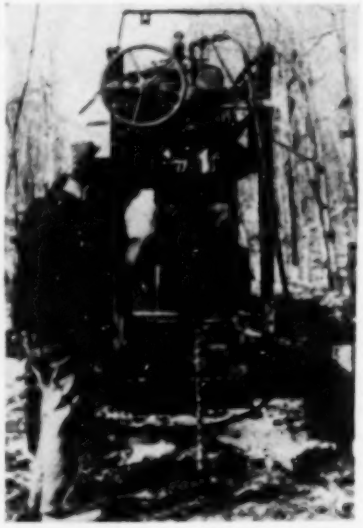
Carbide Bits and Remodeled Unit Up Drilling Efficiency

CARBIDE BITS and a remodeled vertical drill have teamed up to double penetration rates, decrease bit cost by 75% and increase drilling limit by 300% for an anthracite operator doing exploratory work preparatory to stripping.

Drilling is done with a 30-hp gasoline-driven Parmanco vertical unit. Difficulties formerly encountered included binding of the material around the auger scrolls and breaking of augers. Another disadvantage overcome by the changes was rapid dulling of bits when drilling boulders or sandstone strata. Drill conversion was obtained by removing the original drill socket, boring the main shaft with a ⅝-in hole through its entire length, and tapping the bottom of the shaft and threading to accommodate a Kennametal Style CSA connecting stud. The top of the drive shaft was tapped and threaded to fit a Sprague & Henwood diamond-drill swivel. A 200-cfm compressor was added to supply air for flushing the holes.

Other tools completing the unit are Kennametal Type AT16 3½-ft scroll-type augers, Type ATF 2-in flat bits and Type ATC 2-in two-prong drill bits having threaded shanks and air ports.

With these changes, holes can be drilled to depths of over 100 ft with ease. The use of air enabled the drill to penetrate heavy soil and wet clay, and binding around the scroll was eliminated. Ejection of cuttings permits keeping an accurate log of the hole as drilling proceeds.



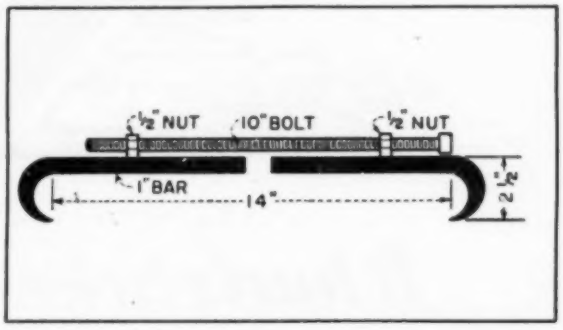
INCREASED DRILLING CAPACITY for this explanatory unit was achieved by remodeling the drill and installing carbide bits to cut hard material. Bits have air ports to permit air-flushing of holes.

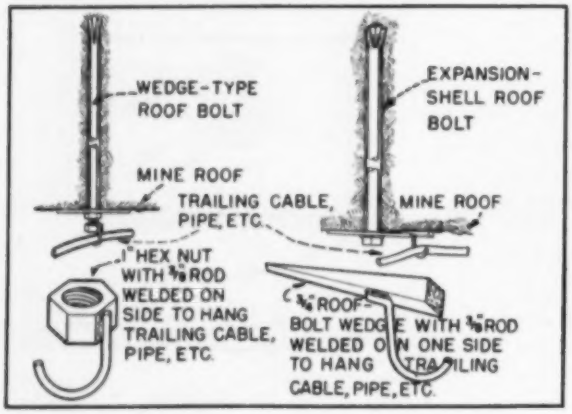
No dust problem exists in drilling dry material since the auger scroll acts as a baffle. In wet material, the compressed air maintains the cuttings in agitation and they are effectively removed in loose form.

Special Tool Speeds Cutter-Chain Repair

REPAIR of a broken cutter chain in slightly over one-third the time required with conventional methods is achieved by using this special tool, reports Harry Lanier, electrician helper at The New River Co., Summerlee, W. Va. Two pieces of 1-in bar, each 9½ in long, are shaped into hooks by bending at points 2½ in from the ends. The tips of the hooks are sharpened for easy insertion and a ½-in nut is welded to each of the hooks at the midpoint of the straight section. A 10-in bolt threaded through the two nuts provides adjustment when broken chains are coupled.

When a chain breaks in the mine, the tool is inserted into the openings of the next solid links and tightened. Then the machine controller is turned on and the chain run to a position where the broken link can be repaired. A broken chain on a 512CC machine can be repaired in 1 hr and 10 min whereas it usually takes 3 to 4 hr, Mr. Lanier points out.




WEDGE-TYPE ROOF BOLT
EXPANSION-SHELL ROOF BOLT
MINE ROOF
TRAILING CABLE, PIPE, ETC.
MINE ROOF
1" HEX NUT WITH ⅜" ROD WELDED ON SIDE TO HANG TRAILING CABLE, PIPE, ETC.
¾" ROOF-BOLT WEDGE WITH ⅜" ROD WELDED ON ONE SIDE TO HANG TRAILING CABLE, PIPE, ETC.

Suspension Hooks Save Cables

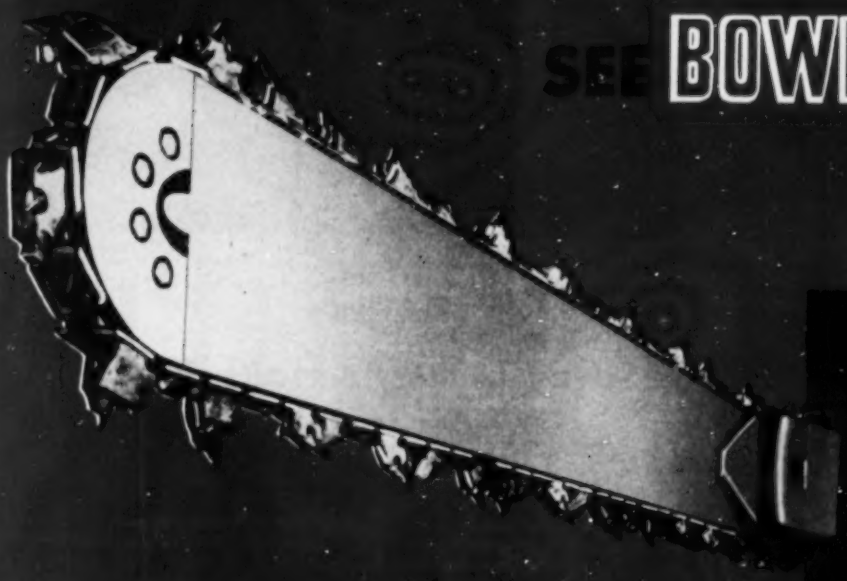
KEEPING cables and pipe lines off the mine floor in roof-bolted areas is simplified by using adapter hook supports, according to Gus Stefanick, foreman, Eastern Gas & Fuel Associates, Grant Town, W. Va. He designed two easily installed devices that are used successfully with expansion-shell and wedge-type roof bolts.

A 1-in hex nut with a piece of hook-shaped ⅜-in rod welded to the side is fitted onto protruding threads of wedge-type bolts. Where expansion-shell bolts are used, a ¾-in roof-bolt wedge with a ⅜-in-diameter hook welded to the side is driven between the bearing plate and the roof.

Mr. Stefanick points out that cables supported on these hangers have longer life because they are not damaged by equipment running over them and are kept dry and clean; hence failures are reduced.

coal cutting costs make you see Red ?

SEE BOWDIL* . . .



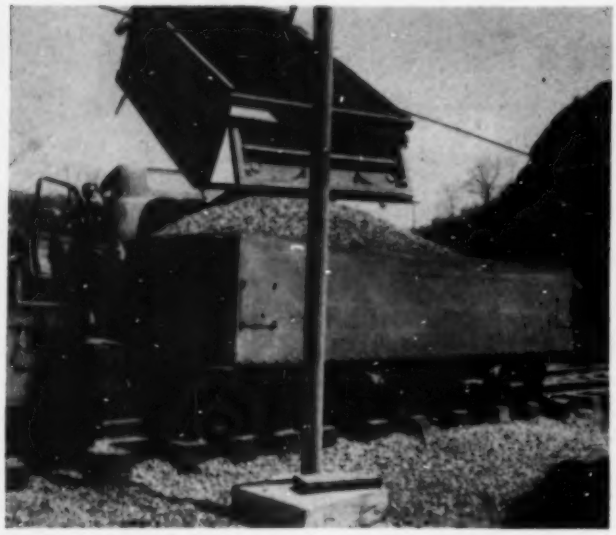
▲ West Kentucky Coal Company, Madisonville, Kentucky, cuts costs in their East Diamond Mine with this mobile cutting machine using Bowdil 9-ft. Cutter Bar, Bowdil Chain and new 1-29 Bowdil Bits.

PHOTO BY MR. VANDEVEER FOR WEST KENTUCKY COAL COMPANY IN CONJUNCTION WITH SYNDICATE COAL MAGAZINE.

BOWDIL

CANTON OHIO

* DESIGNATORS OF THROW-AWAY BITS, MANUFACTURERS OF BASE BITS, CHAINS AND OTHER PRODUCTS FOR COAL MINING. CUSTOM MACHINERY DESIGNERS AND BUILDERS, HEAT TREAT SPECIALISTS. SALES AGENTS FOR THE CINCINNATI ELECTRIC DRILL.



NEW BALLAST CAR, built to company specifications, is filled from a dump truck that has backed up a short ramp. Note the double-crank control of a hopper door at the upper left end of the car. Full-width gate door opened the right amount distributes ballast to the depth desired (right).

Ballast-Spreader Car Saves Time and Hard Work

THE LABOR OF SPREADING BALLAST is held to a minimum at the Hendrix mine of the Consolidation Coal Co. (Ky.), Deane, Letcher County, Ky., with use of an 8-ton car built to coal-company specifications by the Differential Steel Car Co. Mainline haulage at the mine utilizes 23-ton mine cars, which up to the present have been operated exclusively on outside tramroads. Soon, however, the large cars will be taken underground in a main haulageway now being mined, brushed, bolted or timbered, and fitted with permanent track.

The 8-wheel ballast car has a hopper bottom and two body-width gates whose openings are controlled by double cranks located at the top center of the car on either end. When the body-width gates are opened to the right degree and the car is moved slowly and steadily along, a layer of ballast of the desired thickness is automatically distributed over the track.

Large Storage Tanks Eliminate Oil-Drum Handling

INSTALLATION of two 10,000-gal tanks, a pump and pipe lines leading to points of use has eliminated handling 400 50-gal drums of oil each month at the Piney Fork mine of the Hanna Coal Co., Div. of Pittsburgh Consolidation Coal Co., Piney Fork, Ohio.

Set up under the direction of Evan Adams, superintendent, the two tanks are used for storing hydraulic and transmission oil delivered to the mine by either railroad tank car or by tank trucks. A pump powered by a 15-hp AC motor develops about 200 lb of pressure and handles both types of oil. The system is set up on an automatic pressure so that the outlet valves work similarly to water faucets—turn them on, and the oil is there, ready for use. Outlets are installed at the old tipple, machine shop and preparation plant.

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FULL LUG

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The rougher your hauling jobs, the more you need the Con-Trak-Tor! It's built to *take punishment*—with triple-impact protection: extra rubber between plies, double shock-pads, rock-resister cap plies. It's built to *deliver traction*—with exclusive full-lug design. Mount it—and *save* from that day on!

Also available in All-Nylon for heaviest duty

Get Full Proof—Phone your U. S. ROYAL Dealer Now!

Specialized by U. S. ROYAL to do your jobs better!

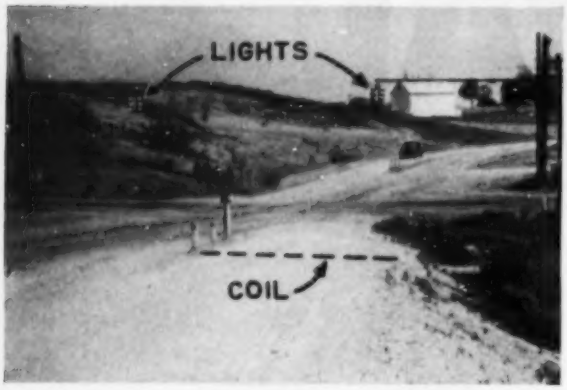
U. S. ROYAL FLEETMASTER
Smooth rolling *on* the road, superior traction *off*. 70% more tread depth!

U. S. ROYAL ROAD TRACTION
New steering ease where most hauling is on-road at reasonable speed.

U. S. ROYAL LUG TRACTION
Best for high traction at low speeds off the road or on unimproved roads.

U. S. ROYAL TIRES *Product of* UNITED STATES RUBBER COMPANY

Electronic Traffic Light Speeds Strip Haulage



SPEEDUP OF HAULAGE of strip coal by electronic control of traffic is achieved by a company-designed traffic light installed at the strip operation of the Hanna Coal Co., Div. of Pittsburgh Consolidation Coal Co., near Adena, Ohio. To carry coal to the Georgetown preparation plant, large 47-ton haulage units must cross a state highway and drivers would normally slow down or stop at the intersection if there was no light. Now, as trucks approach the intersection they cut lines of flux from an electric coil buried in the road, setting into operation the electric controls for changing the light from green to red on the state highway. The light remains red against highway traffic for 18 sec or until three trucks have passed the intersection. Under no conditions does the light remain red for more than 25 sec in either direction, therefore, there are no traffic tieups.

In addition to permitting trucks to cross the intersection without stopping, Hanna management points out that the chance of human failure is eliminated.

How to Diagnose and Cure "Sulphated" Batteries

A "SULPHATED" BATTERY is one that has been undercharged to the point where abnormal lead sulphate has formed on the plates. In such a condition, the chemical reactions within the battery are impeded and loss of capacity and complete failure may result.

This 11-point program to "cure" a sulphated battery, together with six causes of sulphation that should be avoided, are offered by Gould-National Batteries, Inc. It is important to detect a "sulphated" battery as soon as possible, Gould-National points out. The sooner treatment is started, the less the damage will be and the earlier the battery can be returned to service.

WHAT TO LOOK FOR

Here's how you can diagnose a sulphated condition. All cells of a sulphated battery will give low specific-gravity and voltage readings. An internal inspection will disclose negative plates having a slate-like feeling, with the sulphated negative-plate material hard and gritty and having a sandy feeling when rubbed between thumb and forefinger. Internal inspection should be made after a normal charge since a discharged plate is always somewhat sulphated. A normal fully charged negative plate is spongy and springy to the touch and gives a metallic sheen when stroked with the fingernail or a knife. A sulphated positive plate is a lighter brown color than the normal plate.

SIX CAUSES TO AVOID

Most cases of sulphation are caused by:

1. Undercharging, Partial Charging, or Neglect of Equalizing Charge—When a battery is charged repeatedly at low rates the acid is not effectively driven out of the plates, particularly the lower parts, and sulphation results. Repeated partial charges, stopping before there is sufficient gassing to effect a thorough mixing of the electrolyte, results in sulphation. It is difficult in normal battery operation to determine just when sulphation begins, and only by giving periodic equalizing charges and comparing individual cell specific-gravity and voltage readings can the condition be detected in its early stages and corrected or prevented.

2. Standing in a Partially or Completely Discharged Condition—Permitting a battery to stand in a partially discharged condition enables the sulphate deposited on the plates to harden and the pores to close. Batteries should be charged as soon as practicable after discharge and not permitted to stand in a completely discharged condition for more than 24 hr.

3. Low Electrolyte—If the level of the electrolyte is permitted to fall below the tops of the plates, the exposed surfaces will harden and become sulphated.

4. Adding Acid—If acid is added to a cell in which sulphation exists, the condition will be aggravated.

5. High Specific Gravity—In general, the higher the fully charged specific gravity of a cell, the more sulphation is likely to occur and the more difficult it is to reduce. In any battery, if there are cells with specific gravity of more than 0.015 above average, the possibility of sulphation of those cells will be increased.

6. High Temperature—High temperatures accelerate sulphation, particularly of an idle, partially discharged battery.

HOW TO CORRECT SULPHATION

You can often restore a sulphated battery to good operating condition by thorough and careful attention to these steps.

1. Clean the battery.

2. Bring electrolyte level to proper height by adding WATER.

3. Put battery on charge at the prescribed finishing rate until full ampere-hour capacity has been put into the battery based on the 8-hr rate. If at any time during this procedure the temperature of the battery exceeds 110 F, reduce the charging rate to maintain temperature at or below this point. If any cell gives low readings (0.2 v less than the average cell voltage of the battery), remove and repair the cell before continuing with the procedure.

4. Continue the charge at the finishing rate until the specific gravity shows no change for a 4-hr period with readings taken hourly. Record voltage and specific-gravity readings. Correct specific-gravity readings for temperature. These readings indicate the battery's state of charge.

5. Place battery on discharge at the 8-hr rate and during the test record individual cell voltages and over-all battery voltage at the following time intervals: 15 min after test is started, then hourly until voltage on one cell reaches 1.80 and from then on at 15-min intervals. From this point on the cell voltages should be under constant observation and the time recorded when each cell voltage goes below 1.75 v. Terminate the test discharge when the majority of the cell voltages reach 1.75 v, but stop the test before any single cell goes into reversal.

6. If the battery gives rated capacity, no further treatment is required other than normal recharge and equalization of gravity.

7. If the battery does not deliver near-rated capacity, continue the discharge without adjusting the discharge rate until one or more cells reach 1.0 v.

8. Recharge battery at the finishing rate as described above, again charging until there is no further rise in specific gravity over a 4-hr period, readings taken hourly.

9. Discharge again at the 8-hr rate and if the battery gives full capacity, recharge and put into service.

10. If this procedure does not result in full capacity, repeat once more as noted above.

11. If battery does not respond to this treatment, it is sulphated to the point where it is impractical to attempt further treatment and it should be replaced.

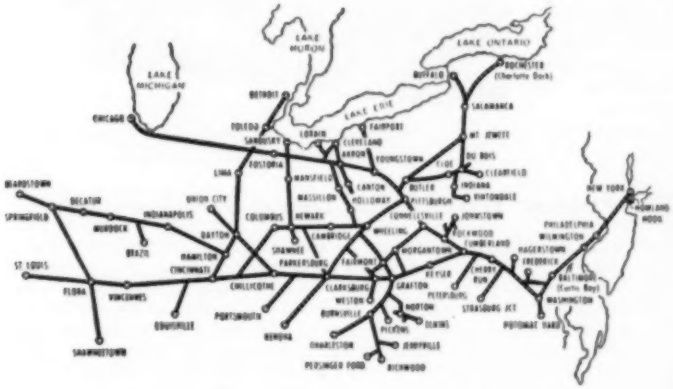
Your "burning question" is quickly answered—with

B&O Bituminous

Whether your specific question concerns power, coking, steam, or space heating, you'll find the perfect answer among the wide variety of Bituminous coals in Baltimore & Ohio territory. Here lies an almost inexhaustible source of low-cost heat and energy.

The benefits of B&O Bituminous are many. Highly mechanized mines keep production costs low, size and quality uniform. Closeness to America's industrial heart means economical transportation. The ease of storing coal eliminates the need for expensive facilities. And new methods and devices take further advantage of the burning characteristics of Bituminous.

ASK OUR MAN! He will help you find the exact coal for your purpose, and explain the best way to burn it. You'll be amazed at the efficiency, economy, and cleanliness of B&O Bituminous today.

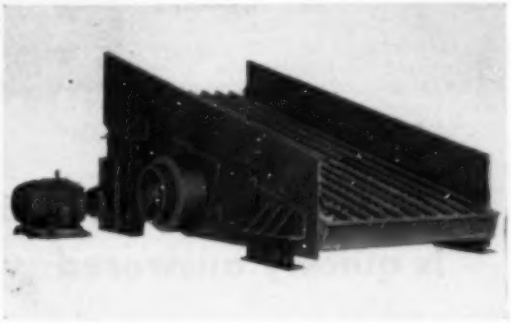


BALTIMORE & OHIO RAILROAD

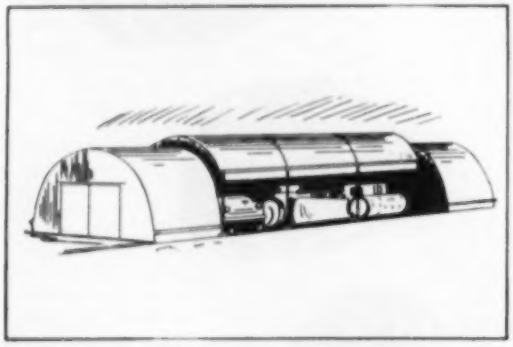
Bituminous Coals for Every Purpose

Equipment News

Scalping Screen for Heavy-Duty Application (1)



New Link-Belt heavy-duty scalping screen designed for fast economical scalping features a sturdy deck to handle the high impact of large lumps formed by a combination of wide flanged H-beams and deep-section ship channels, stress relieved for maximum strength and freedom from distortion, the maker reports. The full-floating vibrator mechanism is completely enclosed for operation under severe dust conditions and screen movement is easily adjusted by varying the segmental weights. Large helical springs isolate vibration from foundations, concentrating vibrating motion in the wide deck for thorough action of the deepest bed. The deck can be furnished either with grizzly or heavy perforated plates with riding bars. Folder 2461 with full details offered by Link-Belt Co., Chicago 1.

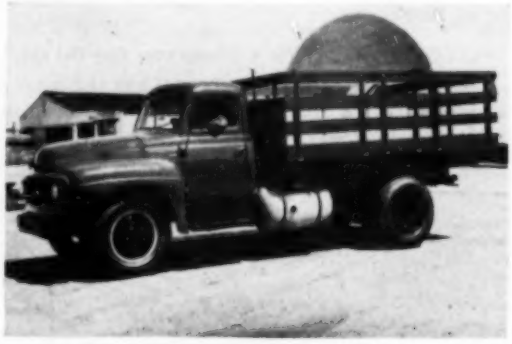


Track-Mounted Sectionalized Buildings For Yard and Machinery Storage (2)

Newly developed Yard-Stor storage shelters consist of a series of identical metal sections mounted on a track to form a building, similar in appearance to the conventional hut, providing permanent, temporary or portable cover for machinery and supplies or for various specialized uses. The sections tilt from side to side for easy access, slide apart for unlimited headroom, telescope and nest to expose all or part of the shelter's contents. The sections are readily portable and may be used without the track for temporary storage. Application of the structures as a repair shop or garage and as cover for repair or installation jobs are among the many other uses cited by the maker. Bulletin and full details from the Yard-Stor Shelter Co., Detroit 3, Mich.

Five New Medium-Duty LPG Trucks (3)

Five medium-duty trucks in the R-160 series with liquefied-petroleum-gas fuel systems have been announced by the International Harvester Co., Chicago 1, which reports that it is the only truck manufacturer to offer Underwriters' Laboratories-listed factory-installed LPG fuel systems in this weight class. Ranging in gross vehicle weight from 14,000 to 17,000 lb, the models are the RP-160, RP-161, RP-162, and RP-164 Loadmaster for heavy hauling and the RP-165 for over-the-road tractor service. The engine is the 108-hp valve-in-head International Silver Diamond 240. Typically lower in cost than gasoline, LPG is in abundant supply, with ever-increasing production and reserves and rapidly expanding distribution, the company points out. Full data from International Harvester.



Pusher Tractor for Large Scrapers (4)

A D8 pusher tractor, adapted and equipped specifically for pusher loading work to meet demands for a tractor capable of heap loading large scrapers, has been announced by Caterpillar Tractor Co., Peoria 8, Ill. The new unit is a modified version of the D8 tractor, combining in a complete package a 150-db-hp tractor, No. 8S bulldozer, and No. 23 cable control. Major features cited by the maker include more-powerful engine; weight increased to 50,025 lb for better pusher balance and increased traction; bulldozer and cable controls for inline pushing action and cleanup of cut; new transmission for more suitable pushing speeds and oil-type clutches for longer life; and a new tandem pusher frame for difficult loading conditions that permits transfer of power from one tractor to another through the track roller frame. Full data offered by Caterpillar.

...with TYCOL lubricants on hand!

Coal preparation plants are solving a basic lubrication problem!

In one instance, 20,000 tons per day are processed for coking. Yet, *one* gear lubricant – Tycol Apreslube – serves throughout! Rather than chance a costly error by stocking and using eight to ten different lube oils, this operator found Apreslube ideal for literally hundreds of gears – worm, spur, and herringbone – in all sizes. Result? Simplification ... and longer gear service! Apreslube's EP properties reduce wear to a minimum ... other features combat moisture introduced through "breathing action".

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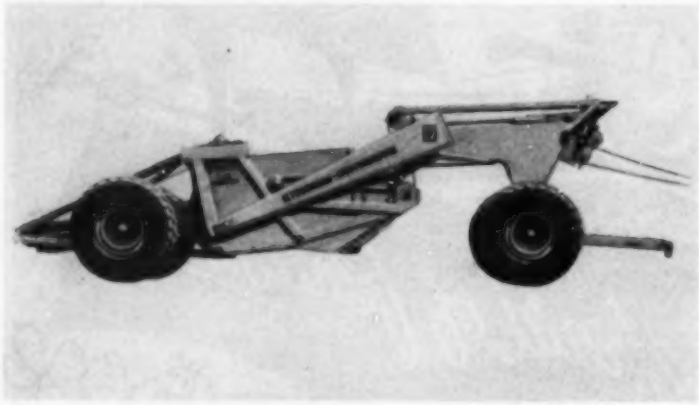
Side-Dump Trailers for Varying Conditions (5)

A wide range of combinations of Easton side-dump trailers and truck bodies provides maximum flexibility to meet varying conditions in pit haulage and also facilitates maintenance, according to the builder. The combinations include tractor and double trailer and truck and trailer employing standard Easton side-dump trailers and truck bodies. A standard Easton dolly, equipped with trailer axle, jumper hose, airline couplings and hitch, makes the combination possible. Easton side-dump trailers and truck bodies are available in several capacities in lift-door, drop-door and pan-type designs. Drop-door units employ integral hydraulic hoists and may be dumped anywhere. Lift-door and pan-type bodies are dumped by an overhead electric hoist at a fixed discharge point. Advantages of the combination principle cited by the builder include large haulage capacities with a single prime mover and per driver, as well as adaptability to use as single or multiple units to meet varying conditions or changes in weather conditions. Details from Easton Car & Construction Co., Easton, Pa.

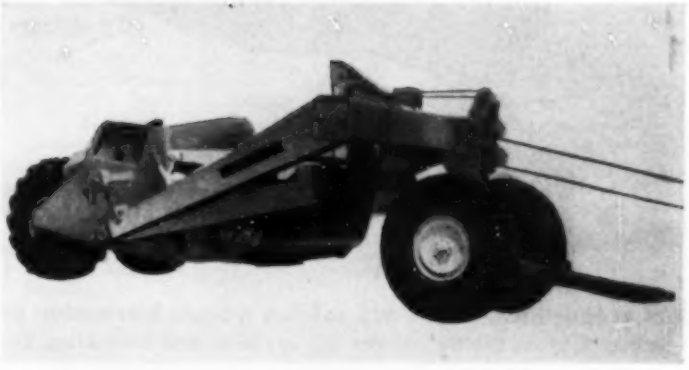
Scrapers Offer 10½- to 28½-Yd Capacities (6)

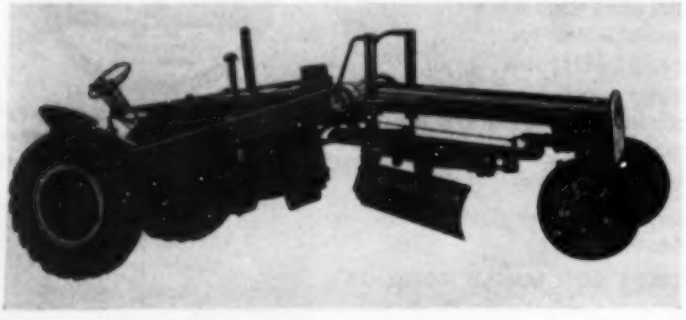


A new line of open-top tractor-drawn rubber-tired scrapers ranging in capacity from 10½ to 28½ yd has been announced by LeTourneau-Westinghouse Co., Peoria 3, Ill. Designed to fit any tractor-scraper job, they are available in four sizes as follows: O-14 Carryall scraper, designed for use with tractors of 70 hp or more, with a capacity of 8.1 yd, struck, and 10.5 yd, heaped; O-19 Carryall, for tractors of 75 hp and more, 12.2 yd, struck, 16 yd, heaped; O-23 Carryall, for tractors of 80 hp or more, 14.4 yd, struck, 19 yd, heaped; and the O-35 Carryall, for tractors of 100 hp or more, 22.5 yd, struck, 28.5 yd, heaped. Among the many engineering features of the units cited by the maker are welded construction throughout; elimination of overhead cables to facilitate loading; double-drum power control units; positive ejection of material; and a hard-surfaced, self-sharpening reversible blade. Additional information from the company.

Faster Operation for 19-Yd Scraper (7)

Introducing a new open-bowl design, Wooldridge Mfg. Co., Sunnyvale, Calif., announces its new Model OS-152 tractor-drawn scraper with a capacity of 19 cu yd, heaped, and 15.2 yd, struck. Among the features of the unit cited by the maker are an extremely low gravity center for stabilized balance in all positions; high 25-in ground clearance offering increased maneuverability; wide 75-in apron opening for unrestricted discharge of sticky materials; and faster and easier loading through application of the "boiling bowl" principle. Full details from the company.





Compact Motor-Grader Unit (8)

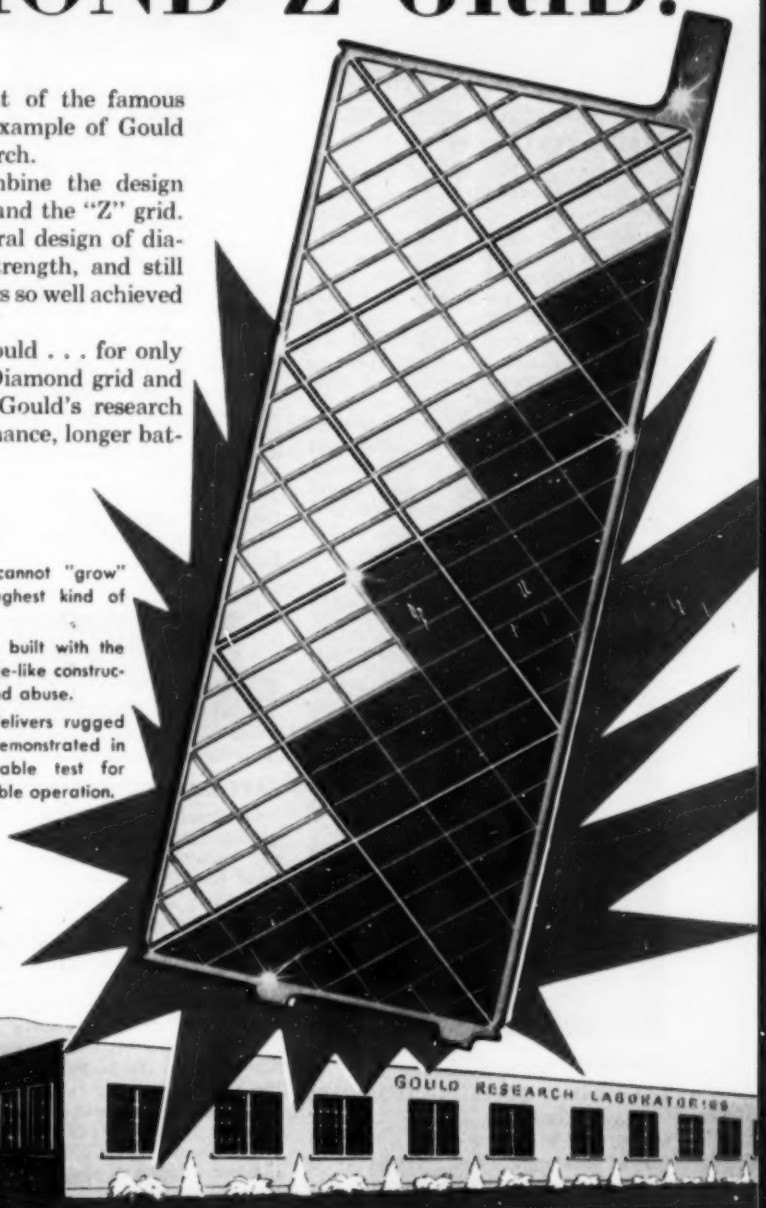
A new low-cost grader, announced by the M-B corp., New Holstein, Wis., is engineered for Case SI or DI tractors and is built as a compact unit to handle most any grading and all maintenance jobs. The unit handles a 10-ft blade and may be attached or removed in less than an hour, leaving the tractor available for other jobs. The grader attachment may be secured separately for Case tractors now in the field and various attachments for year-around utility are available. Details from the company.

Out of the Great Gould Laboratories Comes the *NEW* DIAMOND "Z" GRID!

HERE is the most recent achievement of the famous Gould Laboratories . . . one more example of Gould progress through *continuous* battery research.

New research developments now combine the design advantages of the original Diamond grid and the "Z" grid. The Diamond "Z" gives you the structural design of diamond bracing and overall mechanical strength, and still retains the uniform density of grid members so well achieved in the "Z" design.

This advance could only come from Gould . . . for only Gould has the experience with both the Diamond grid and the "Z" grid. Another step forward in Gould's research program to give you extra battery performance, longer battery life! When you buy, buy Gould!



HERE'S WHAT YOU GET:

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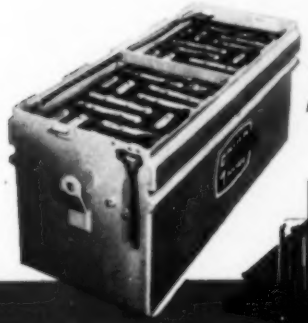
2. A grid that has been tested under rugged operating conditions . . . tough day in and day out service.
3. A grid built to meet tomorrow's needs . . . years ahead of requirements.
4. A grid that cannot "grow" under the toughest kind of treatment.
5. A grid that is built with the diamond bridge-like construction to withstand abuse.
6. A grid that delivers rugged service . . . demonstrated in every conceivable test for long, dependable operation.



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THE GOULD "THIRTY"—
America's Finest
Mine Shuttle Car Battery

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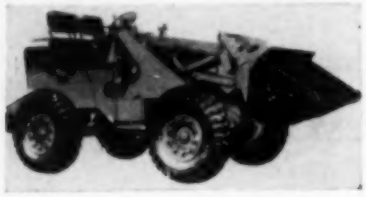
GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

DUST COLLECTOR USES WATER CURTAIN (9)

American Air Filter Co., Louisville 8, Ky., has announced its Design 4 Type N Roto-Clone dust collector, an improved hydro-static precipitator that separates the dust from the air by use of an S-shaped water curtain said by the maker to be highly effective in collecting most types of process dust. The unit is available in capacities from 1,000 to 48,000 cfm and in three basic arrangements which are identical in operating principle but differ in hopper design and method of sludge removal. Among the improved features cited by the maker are non-plugging water entrainment separators; heavier sludge-ejector mechanism; and sectional construction to permit field conversion from one arrangement to another. Bulletin 277 with details offered by the company.

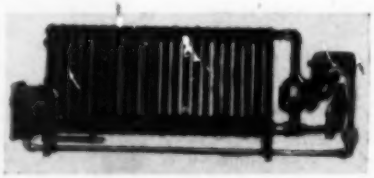
CONTROL CENTER OF ALL-ALUMINUM CONSTRUCTION (10)

The first all-aluminum control center—said to be 65% lighter than its steel and copper counterpart—has been developed by the Westinghouse Electric Corp., Box 2099, Pittsburgh 30, in response to requests from various industries where corrosive atmospheres are a problem and cleanliness and neatness are particularly important. In addition to the good characteristics gained through use of aluminum, the design incorporates various important features of conventional units, such as economical use of space; economy of installation; reduction of work hazards; efficient control supervision; individual component structure simplifying maintenance; and easy removal of individual units. Details from Westinghouse.



FRONT-END 1½-YD LOADER (11)

A new 1½-yd front-end Shoveloader with a 6,000-lb working capacity, 4-wheel drive and power steering, parallelogram loader action and a 100-in wheelbase for stability has been announced by the Baker-Lull Mfg. Co., 314 W. 90th St., Minneapolis, Minn. Designed for jobs requiring high-capacity loading under very difficult conditions, the unit features Hi-flotation tires and high underclearance to permit efficient operation under extreme conditions of mud, snow, sand and uneven ground. It has a 5-speed transmission, forward or reverse, coupled with a shuttle-gear transmission permitting a quick change of direction. The Shoveloader is powered by a 6-cylinder Hercules engine, with a 93-hp gas or 77-hp diesel engine optional. A complete range of accessories is available. Bulletin offered by Baker-Lull.

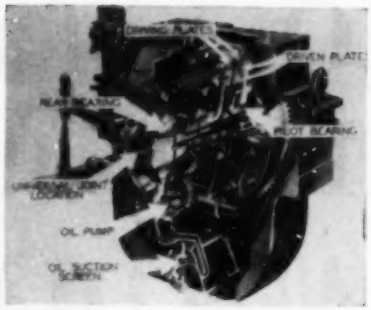


SAFE ELECTRIC RADIATOR (12)

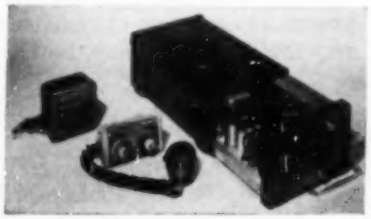
Designed for use in areas where dangerously explosive atmospheres normally are present, the Burnham explosion-proof electric radiator is a self-contained completely safe heating unit fully automatic in operation. It is electrically controlled and heated but is so constructed that it cannot cause an explosion, according to the maker. Thermostats and cut-off switches, where electric arcs may occur, are sealed in heavy cast-iron housings strong enough to cointain any flash if by any chance they are penetrated by explosive gases. The radiator is approved by Underwriters' Laboratories, Inc., for atmospheres of Class 1, Groups C and D; Class 2, Groups E, F and G. Full details from Burnham Corp., Irvington, N. Y.

NEW CLUTCH FOR TRACTORS (13)

A major development, an oil-type flywheel clutch, has been introduced by Caterpillar Tractor Co. on four of its track-type machines. It is now standard



equipment on the D8, D7 and D6 Tractors and the Caterpillar No. 6 Shovel. Said by the maker to be the first successful oil-type clutch to be put into use in the crawler-tractor field, it will operate two to four times longer than an equivalent dry clutch before major adjustment or overhaul is necessary. It is expected that under ordinary operating conditions its overhaul period will coincide with the normal overhaul of the engine, according to Caterpillar. The constant flow of oil through the clutch acts as a cooling agent and makes this unit particularly adapted to severe service and high temperature operations. Full details from Caterpillar Tractor Co., Peoria 8, Ill.



MOBILE 2-WAY RADIO (14)

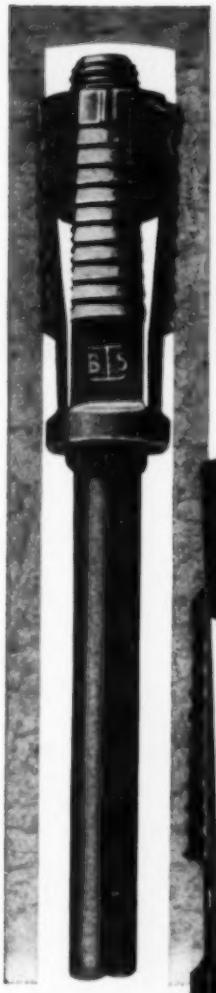
Motorola Inc. has added several mobile models designed for automobile-trunk installation to its diversified line of 25-54 mc FM 2-way radio equipment. The new 30- and 60-w models feature innovations such as their use interchangeably in 6- and 12-v vehicles without revising internal wiring, dual interrupter vibrator power supply and a reduced primary power drain of almost 50%. The newly introduced equipment utilizes separate transmitter, receiver and power-supply chassis assembled into a compact drawer-type housing and all operational accessories, including a functional dash-mounted control unit, are included as a part of each model. More details from Motorola, Inc., Communications & Electronics Div., Chicago 51.

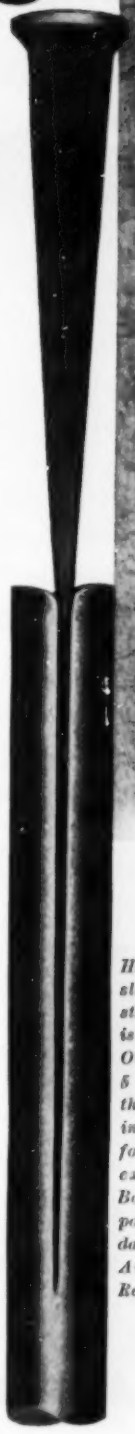
NEW-TYPE DC WELDER (15)

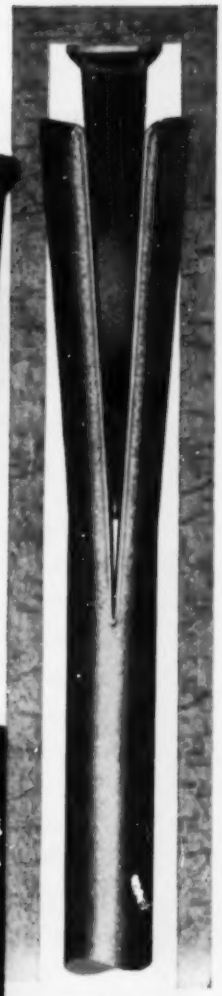
Development of a redesigned selenium-rectifier DC arc welder incorporating characteristic advantages of all static plate-type rectifiers in addition to less weight and size, greater ease of maintenance, and wider versatility and user convenience has been announced by Westinghouse Electric Co., Box 2099, Pittsburgh 30. For the first time in any welder, coils have been made of alumi-

Roof Bolts

MAKE A SAFER MORE EFFICIENT MINE







You can make your mine a safer place for workers — and a better money-maker as well—by using Bethlehem Roof Bolts in entries, air-courses and rooms.

Bethlehem Roof Bolts contribute to improved safety and better operating conditions because they lock the roof in place by consolidating the overlying rock strata into a thick, single-unit beam. The danger of severe roof falls is minimized.

Bethlehem Roof Bolts also offer these other worthwhile advantages: (1) increased production (2) elimination of timber supports (3) improved ventilation (4) wider mine openings (5) greater side clearances, and (6) faster haulage.

To enable you to obtain these improved conditions, Bethlehem produces the two types of roof bolts shown. The bolts are made from new-billet steel, and come in lengths of from 2 ft to 8 ft. They can be installed either vertically or at angles. Full details may be obtained by writing to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

SQUARE HEAD ROOF BOLT

Furnished with expansion shell. Bolt has rolled threads and unchamfered head. For 1⅝-in. hole. Pressed ears on shank support shell during anchoring. When bolt is tightened, leaves of shell expand, lock against sides of hole to provide holding pressure, and to prevent shell from turning.

SLOTTED ROOF BOLT

Has centered, forged slot to accommodate steel wedge. No metal is removed by slotting. Other end of bolt has 5 in. of 1-in. rolled threads. When driven in 1¼-in. hole, wedge forces itself into slot, expanding bolt-end. Bolt has truncated-cone point to prevent thread damage. Fitted with American Standard Regular Square Nut.

BETHLEHEM STEEL

BETHLEHEM MINE ROOF BOLTS

SuperDuty Cleans Fine Coal Sizes With Unsurpassed Efficiency

The measure of efficiency in coal cleaning is not just in the quality of the washed coal product. The SuperDuty Diagonal Deck Table, bowing to none on a quality standard, assures maximum recovery of available coal in the feed . . . and the capacity for optimum cleaning of fine coal is unsurpassed by any other table or process on the market today.

Along with such efficiency, the operating economy of a table installation . . . and its low maintenance costs . . . reward you with a high return on the investment. Large and small operators alike are daily turning to SuperDuty table cleaning of their fine sizes. Send for Bulletin 119.

CONCENCO SPRAY NOZZLES

These handy nozzles are simple, flexible and economical. All you do is drill your holes, clamp on and get results. They can be definitely aligned for washing, sluicing or spraying according to need. They are removed or replaced in a moment's time.

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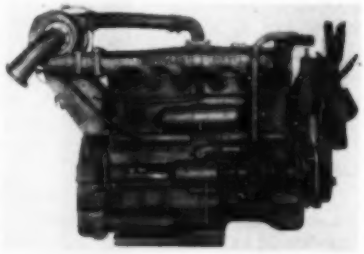
num, a major factor in the reduction of size and weight (for example, from 510 to 400 lb in a 300-amp unit). Other design modifications also have helped in such reductions, as well as providing simplified construction, improved appearance and better ventilation. The welder is available in standard sizes of 200, 300 and 400 amp, with Duplex models rated at 300/600 and 400/800 amp. To facilitate maintenance there is a high degree of interchangeability of standard parts in all ratings. Efficiency and performance characteristics compare to those of former models. Full data from Westinghouse.

HOIST LINE BROADENED (16)

A total of 53 different models and sizes of spur-gear hoists have been added to the Coffing line, the company has announced. Included are 15 sizes of single- and multiple-chain spur-gear hoists with capacities from ¼ to 25 tons. For specialized applications, there now are plain and geared army-type hoists, ¼ to 10 tons, and extended hand-wheel hoists from ¼ to 3 tons. In the army and low-headroom models, the hoist is an integral part of the trolley, permitting use where lack of headroom prohibits standard units. Clevis-connected hoists are used where speed and efficiency of conventional Coffing spur-gear hoists are desired but where headroom prevents the standard hoist and trolley hook up, since design saves from 3 to 16 in headroom. Full details on all models from the Coffing Hoist Co., Danville, Ill.



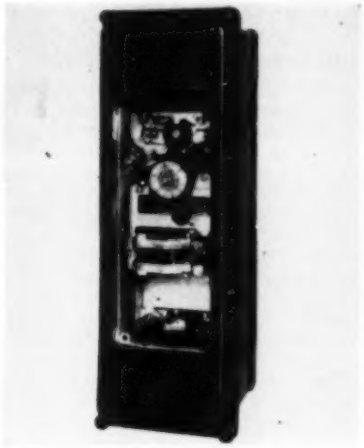
SUPERCHARGED DIESEL (17)

Hercules Motors Corp., Canton 2, Ohio, is now producing a turbo-supercharged version of its 6-cylinder Model DFXE diesel engine. The new DFXE-TS engine has a 5⅝-in bore and 6-in stroke and 895-cu in piston displace-

ment, developing 846-ft-lb torque at 1,800 rpm and 318 hp at 2,000 rpm. The supercharged unit fulfills the demand for more horsepower without increasing fan-to-flywheel length and is particularly suited to powering construction, mining and other equipment in the 300-hp class where a compact engine is important, the maker reports. Details from Hercules.

IMPROVED SPROCKET CHAINS (18)

An improved line of drive and conveyor sprocket chains has been introduced by Chain Belt Co., Milwaukee 1, Wis. Designated as the R and RX Series drive chains and RR Series conveyor chains, they replace and supplement a group of standard sizes of the Rex Chabelco steel chains. Improvements cited by the company include controlled material selection and heat treatment for the ultimate in wear resistance and strength; closer planned tolerances of press fits for longer life and smooth operation; better finishes; easier assembly and disassembly; and operation on standard sprockets. Available at all Chain Belt warehouses and distributors.



RECLOSING RELAY (19)

New Westinghouse automatic reclosing relay (RC) with a built-in instantaneous-trip lockout feature is intended primarily to automatically control the reclosing operation of a circuit breaker, preventing repetitive tripping through action of the instantaneous trip of the protective relay. This feature is particularly desirable where feeders are sectionalized by fuse operation since the closed circuit breaker will then permit the fuse to clear the faulted feeder, the maker points out. Additional external terminals provide connection to internal coils and contacts of this redesigned relay to permit its application to all types of circuit-breaker control schemes. Adjustable reclosing time sequences of 60, 90, 180, or 360 sec are provided by a 600-rpm synchronous motor with a gear train of adjustable ratio. The RC is available in a standard rectangular projection case or in a Flexitest case of the semi-flush or pro-

THE NEWEST, QUICKEST WAY TO MAKE ENDS MEET

the job's a snap...with a snap-joint

Here's the newest development in Mechanical Pipe Couplings—the Victaulic Snap-Joint *boltless toggle* pipe coupling.

The Snap-Joint extends the Victaulic Method into usages where speed and frequent dis-assembly and re-assembly are controlling factors. Snap-Joints assemble over the pipe ends in a matter of seconds with a speedy hand-lock . . . no wrenches required.

Snap-Joints, made to supplement Victaulic's famous line of bolted couplings, are ideal for temporary lines, valve, meter and pump connections and similar uses . . . their strength and durability make them completely reliable for permanent installations.

Snap-Joints fit Victaulic grooved pipe and the complete line of Victaulic Pipe Fittings . . . Ells, Tees, Reducers, Caps, etc. Every joint serves as a pipe union.

New Victaulic Snap-Joints are ready for your next job through all Victaulic Stocking Supply Houses. Available in pipe sizes: 1", 1¼", 2", 3" and 4". They are part of the world famous *complete* Victaulic Method of Piping.

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Neutralizing

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NEUTRALIZER

★NEUTRALIZE THE ACID WATER *before it gets into your plant* and NEUTRALIZE THE ACID WATER *before it leaves the property* from pits, underground mines or any other sources.

"Be Water Wise . . . NEUTRALIZE"

The WANUCO PATENTED WATER NEUTRALIZING PROCESS ends acid water problems, which can be many. Through this effective method complete water systems are protected. Replacements of entire water lines, valves, fittings, screens and all conveyors are greatly reduced.

One coal mining company writes: "The first cost plus the operating cost of this neutralizing unit is VERY small in comparison to the savings in maintenance in our plant."

SEND YOUR WATER SAMPLES IN FOR TEST and OBTAIN OUR RECOMMENDATIONS, or LET US MAKE A SURVEY OF YOUR PROBLEM.

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Henry O. Erb, Manager of Sales & Engineering

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jection styles. Full details from Westinghouse Electric Corp., Box 2099, Pittsburgh 30.

AC WELDERS (20)

Redesigned 300- and 500-amp Metal & Thermit AC welders incorporate advanced features as follows, according to the company: (1) new range switch for fast, easy range-changing—no leads to unplug, no connections to make; (2) power savings—primary switch permits turning current off between welds; (3) large fan keeps case cool.—Metal & Thermit Corp., 100 E. 42nd St., New York 17.

DUST-MEASURING UNITS (21)

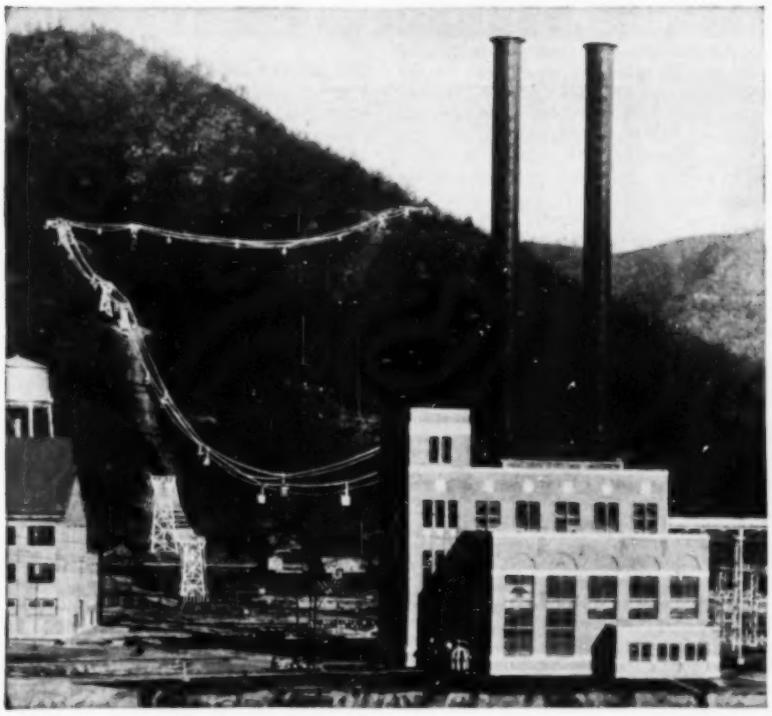
Mine Safety Appliances Co., Pittsburgh 8, has been named exclusive distributor in the United States for a line of dust-measuring instruments manufactured by C. F. Casella & Co., Ltd., London, Eng. The instruments now being introduced for American users include the MSA-Casella "Cascade Impactor," for discriminatory collection of air-borne dusts by particle size; "Settlement Dust Counter," for accurate collection of dust particles or air-borne bacteria; "Thermal Precipitator," for sampling a wide variety of smoke, fumes and dusts, organic or inorganic; and the "Jet Dust Counter," for rapid or "snap" dust sampling without interruption of operations. Detailed information on the application and operation of the units is available from MSA.

SCREEN HEATERS IMPROVED (22)

A design improvement in Hanco electric screen-heating equipment features use of a new type of glass insulation throughout the heater system said by the maker to greatly improve operating efficiency and extend heater life. The composition glass insulation, said to be much superior over previous insulations, has far greater tensile strength, with negligible abrasion and good shock resistance, and absorbs only 1/10 of 1% moisture, thus eliminating possible shorting. Hanco heaters and equipment are now equipped with the new material and it is available for insulation replacements on previous models as needed. Details from F. R. Hannen & Sons, Canton 7, Ohio.

TO ORDER free bulletins, use the postage-paid card facing p 132.

Aerial tramways give low-cost transportation

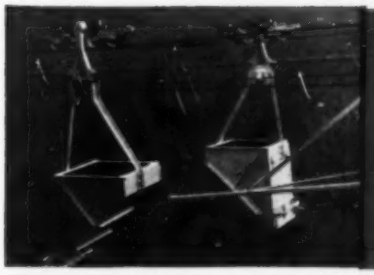


This 8,775 foot bicable tramway has been in continual operation for 23 years, transporting large quantities of coal at low ton-mile cost and giving dependable all-weather service.

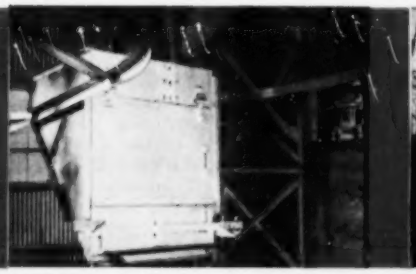
The tramway has two stationary track cables and a traction rope that moves continuously in one direction. Buckets clamp to the moving rope at 205 foot intervals and move at 500 feet per minute.

The 48 cu. ft. end dump buckets load and unload automatically. For loading, buckets detach from traction rope, run on graded rails, and attach again after being loaded. Detaching and attaching are also automatic.

This aerial tramway was designed and installed by the Tramway Division of U. S. Steel at the Alloy, West Virginia, plant of Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation.



Conveying materials for a few hundred feet or for several miles, Columbia-Geneva Tramways can be built to handle from 1½ to more than 300 tons hourly. They can be designed to meet almost every type of operating condition, and to handle many kinds of commodities easily and economically—from a tray of optical lenses to a carload of lumber.



Load carriers, like this one on a bicable tramway, are available in many different types and sizes. Services of Columbia-Geneva's Tramway Division include designing the tramway...supplying the steel...excavating for foundations and erecting support structures...furnishing and installing all wire rope, cables, and electrical and mechanical parts.

Tramway support structures are of many types, depending on terrain and job. Because of this flexibility, tramways are free of ground contour, roads, railroads, etc., are unhampered by bad weather, and can climb extremely steep grades. Other advantages: loads can be moved without rehandling and rights-of-way are easier to acquire.

Send for this free manual on aerial tramways. Write on your letterhead today to the Tramway Division, Columbia-Geneva Steel, 141 Battery St., San Francisco 6, Calif. Or for an expert study of your transportation needs, ask for the services of a Tramway Engineer. He can show how an aerial tramway would pay off for you, and he can contract for its design and all phases of its construction, including materials.

Tramway Division

Columbia-Geneva Steel

Division United States Steel Corporation

UNITED STATES STEEL

what do you expect of ? mine pipe ?

✓ corrosion resistance
✓ abrasion resistance
✓ strength
✓ light weight
✓ low friction loss
✓ high pressure rating

(Up to 400 p.s.i. or higher for special applications)

If you expect the mine pipe you buy to answer these needs . . . and more . . . YOU WANT MPC WOOD-LINED STEEL PIPE!

Typical installations of MPC Wood-Lined Steel Pipe are now successfully handling 25% silica slurries (16 f.p.s. @ 150 p.s.i.) with the expected advantages of economy and dependability. Keep these advantages in mind for your next purchase of mine pipe!

Wood-lined fittings in standard and special designs for all diameters. For catalog and additional information, write Dept. CA.

MPC **MICHIGAN PIPE COMPANY**
Bay City, Michigan

Manufacturers of Wood-Lined Steel, Saran Rubber-Lined Steel, Stainless Steel and Monel Piping. Represented nationally by Saran Lined Pipe Co. Detroit, (Ferndale) Michigan.

Equipment Shorts You'll Want to Check

(23) FOR LONGER BELT SERVICE, a tough rubber capping is being added along the edges of conveyor belts used on underground coal equipment by the Mechanical Goods Div., U. S. Rubber Co., New York 20. The new capping, used on the U. S. Giant conveyor belts, is an extra layer of rubber of special construction which guards against excessive wear and deters the entrance of moisture and fine coal particles into the inner belt fabric and the resultant rapid belt deterioration.

(24) A CABLE REEL FOR DOZER USE, designed to eliminate wastage of large quantities of wire rope resulting from the wearing of small sections, has been announced by LeTourneau-Westinghouse Co., Peoria, Ill. Easily installed, the 14-in Tournarope bantam reel holds 150 ft of ½-in Tournarope. When a section of rope shows wear, usually at the power-control-unit point, it is cut off, and an equal length of Tournarope pulled from the storage reel and reattached. Formerly, installation time was costly, and when the cable broke there was usually a 50-ft section showing no wear but unusable because of its short length. Now, only a short time is needed to pull through and cut off the worn section of the cable and as many as six cuts can be made, saving 50 ft each time.

(25) HIGH-TENSILE LOW-ALLOY STEELS, known as "Otiscoloy," henceforth will go by the trade name of "Jalten," Jones & Laughlin Steel Corp., Pittsburgh 30, has announced. More than 400 fabricators now are using Jalten, particularly in the manufacture of transportation and materials-handling equipment, and it is also used for mining and earthmoving equipment. In addition to its high yield strength, Jalten's resistance to corrosion and abrasion is superior to that of regular low carbon steels, the company points out. Available in three grades, Jalten can be forged, cut and formed, either hot or cold, and features good weldability. J. & L. offers a new 26-p booklet detailing its properties, applications and use.

(26) A HOOK WITH A "SAFETY GATE" that locks automatically and will not open unless the pin is manually depressed is one of the guaranteed safety features of the new Bullard-Burnham safety hook cited by the maker. The addition of the Safety Gate to a new hook makes it literally impossible for the load to slip off, yet the design does not obstruct the throat of the hook and even a full hook load will not snag in loading or unloading operations, it is said. All Bullard-Burnham safety hooks are drop-forged steel as supplied by established hook manufacturers, with component parts cadmium plated. Literature with details on the range of sizes available from the Safety Hook Div., E. D. Bullard Co., San Francisco 3, Calif.

(27) HEAVY-DUTY PUSH BUTTON— New snap-action over-center toggle push button is available from the Westinghouse Electric Corp., Box 2099, Pittsburgh 30. Consisting of two 2-point units, each with one normally open and one normally closed contact, the maintained-contact heavy-duty push button is a permanently assembled unit. Although basically a 4-point unit, the push button's continuous and interrupting ampere rating is the same as the standard 2-point unit, 10 amp continuous, 50 amp maximum, interrupting at 110 v AC; and 2 amp maximum interrupting at 125 v DC. It can be used for either 3-point applications or 2-point service.

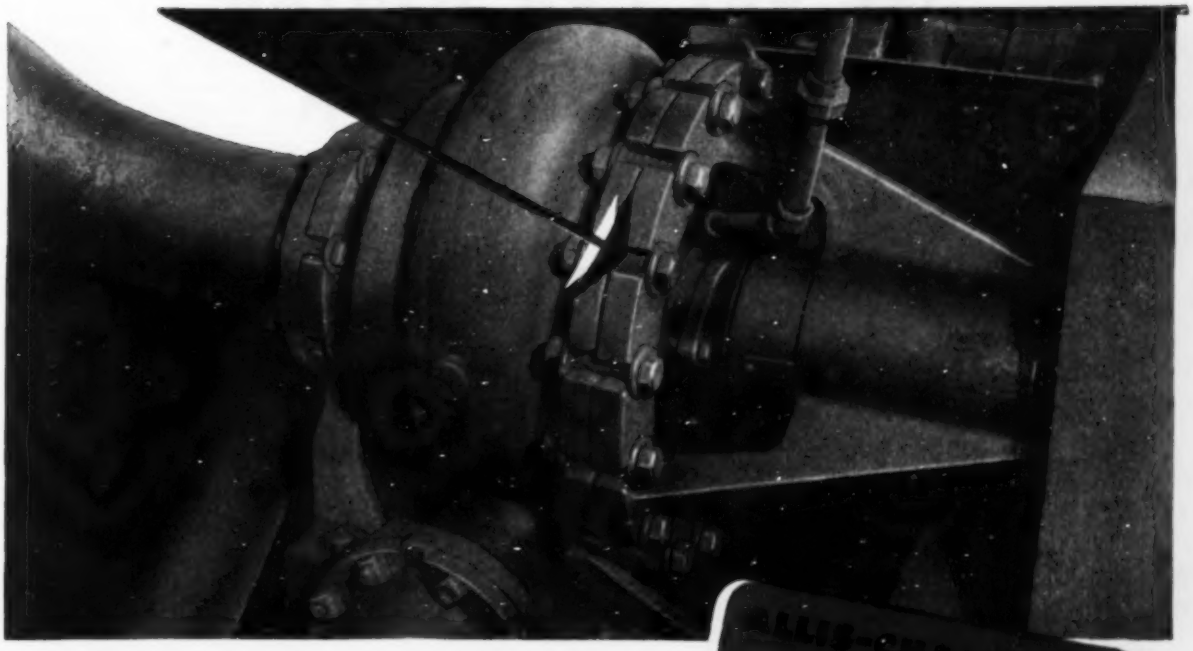
(28) ALL-PURPOSE RUBBER HOSE built with a tough abrasion-resistant cover to withstand sunlight and weather checking, the new "Vari-Purpose" hose is inseparably bonded to a specially compounded oil-resistant tube and reinforced with highest quality braided rayon cord, according to the Hamilton Rubber Mfg. Co., Trenton 3, N. J. Available in ¼- to 1½-in inside diameters and pressures from 125 to 300 psi, Vari-Purpose withstands the deteriorating action of oil, grease, gas, weak inorganic acids and alkalies, horticultural spray solutions, acetylene, and all paints except the lacquers, the company says.

(29) FLUORESCENT LIGHTING FIXTURE said by the maker to be explosion proof and dust tight, for use wherever the presence of explosive gases or vapors or combustible dusts requires safe practical lighting, has been introduced by Crouse-Hinds Co., Syracuse 10, N. Y. The fixture may be spaced end-to-end with other fixtures of its same type, making possible continuous and uniform illumination along work areas. Each fluorescent tube is housed in an individual tube of heat-resisting glass.

(30) UTILITY HOSE, new, wire-reinforced, oil-resistant "Ironsides Utility Hose" developed by Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, is designed especially for multipurpose work where extreme flexibility and resistance to high pressures is required. Ironsides utility hose can be used for air, oil, water, gasoline, sprays, and even for hydraulic lines at working pressures as high as 1,500 psi, the maker says. It is available with either high-pressure reattachable or pressed-on hydraulic fittings, in ⅜- to 2-in inside-diameter sizes.

(31) PORTABLE COMPRESSOR, the 160-cfm Super Chief 160, announced by Davey Compressor Co., Kent, Ohio, is available in 2-wheel and 4-wheel trailer and in skid mountings. The new unit is said by the maker to be from 200 to

Here's a Pump That Maintenance Men Like



ALLIS-CHALMERS
Coal Washing PUMP

- **All maintenance points are easy to reach**
- **Pump can be taken down and returned to service in less than a half hour**
- **Many parts are interchangeable between different pump sizes**

THE Allis-Chalmers coal washing pump is ruggedly built to stand rough coal washing service. And it's easy to work on. Notice how accessible the packing gland is. See how the casing bolts are arranged. Just loosen the nuts a couple of turns and the bolts lift out.

Wearing parts separate into easily handled units. In fact, one man can tear down an Allis-Chalmers coal washing pump, replace a part and have it back in action again *in less than a half hour*. Piping need not be disturbed unless the casing is replaced.

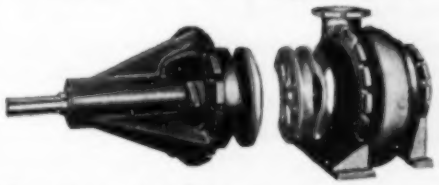
Complete Pumping Unit Furnished . . . Allis-Chalmers can furnish the complete pumping unit — pump, motor, *Texrope* drive and control — assembled and ready to install and run. A *Vari-Pitch* V-belt drive makes it possible to vary head and capacity at the turn of a crank.

Get the Complete Story . . . Every Allis-Chalmers coal washing pump is application engineered by a specialist who knows coal washing equipment problems and how to solve them. Your nearby Allis-Chalmers representative will be glad to give you complete facts and figures on CW pump performance. Or write Allis-Chalmers, Milwaukee 1, Wisconsin and ask for Bulletin 52B6381.

A-4136

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

NOW . . . even longer wear



Impeller and suction plate now made of *Ni-Hard* alloy at no extra cost. You get longer wear, lower pumping costs.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

ALL SET FOR WINTER AT SNOWSHOE, PA.

Winter, in the mountainous soft coal region of central Pennsylvania, is a cruel test of machines. Yet it's just the time when mining men must have dependable machines to keep their operations humming. That's why so many coal men, like R. S. Carlin, winterize with Cat* equipment. One of his Caterpillar D8 Tractors is shown here, leveling spoil at a bituminous strip mine near Snowshoe, Pa.

The D8 is built to work in any and all kinds of weather. Its starting system gives fast, positive results, even on sub-zero days, preconditions the engine, reduces wear, does away with need for pampering.

Like all Caterpillar-built Tractors, the D8 has strength and stamina to keep on working in frozen ground. The husky D8 engine puts out 130 honest HP *at the drawbar*, and develops maximum "push" when it lugs down to a heavy load.

You can stay on the job through quick thaws and spring mud. Tracks keep gripping the ground under all load conditions, and are wide so that the big yellow machine treads lightly over soft ground.

Mr. Carlin reports that the D8 with No. 8U Bulldozer shown here is a "natural" for handling rocky overburden. For other jobs, there are straight and angle 'dozers, with cable or hydraulic controls.

Start your winterizing program now. Your Caterpillar Dealer will demonstrate, on the job, the tractor-bulldozer team that's best for you. And he'll furnish you with prompt service and genuine factory parts—any time, anywhere. Call him today.

Caterpillar Tractor Co., Peoria, Ill.

CATERPILLAR*

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WINTERIZE YOUR JOB WITH CAT EQUIPMENT

USE THIS CARD ➧

. . . TO GET MORE INFORMATION and bulletins.

1,000 lb lighter than other compressors of the same capacity and is offered in both gasoline and diesel-powered models.

(32) DEMAND-TYPE OXYGEN AND AIR MASKS and apparatus supplied by Mine Safety Appliances Co., Pittsburgh 8, will include speaking diaphragms as standard equipment in the future, the company reports. The speaking diaphragm permits clear natural voice transmission to other workers, MSA points out, and sound-powered telephone equipment may also be used with the diaphragms for longer distances. The speaking-diaphragm facepiece has been standard for some time on the MSA "Chemox" apparatus.

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (Oct., 1953)

1	6	11	16	21	26	31	36	41	46	51	56	61
2	7	12	17	22	27	32	37	42	47	52	57	62
3	8	13	18	23	28	33	38	43	48	53	58	63
4	9	14	19	24	29	34	39	44	49	54	59	
5	10	15	20	25	30	35	40	45	50	55	60	

In addition, please send me data on these OTHER products advertised in this issue (give name and page number) .....

.....

Name (Print) ..... **Position** .....

Company .....

Address .....

NOT GOOD if mailed after Dec. 1, 1953

FREE BULLETINS AVAILABLE

(33) HEAT DRYING — Performance records of the Link-Belt Multi-Louvre drier in heat-drying coal are described in a new Book 2466, published by Link-Belt Co., Chicago 1. Nine case histories from mines in West Virginia, Illinois, Kentucky and Indiana discuss the drying of metallurgical coal, slurry fines and raw coal in a wide size range. The Multi-Louvre drier effectively reduces moisture content of any size coal between 1½ in and zero at rates as high as 150 tph, the company points out. One installation described handles slurry being reclaimed from an old spoil pile, with the drier reducing surface moisture from 12 to 1% to make the slurry marketable. The book reviews basic requirements for heat-drying coal successfully and shows how the requirements are met with the Multi-Louvre unit.

(34) PACKAGED ADJUSTABLE-VOLTAGE DRIVES for variable-speed applications are covered in a 16-p Booklet B-5808 available from the Westinghouse Electric Corp., Box 2099, Pittsburgh 30. The booklet provides complete information, including construction and operation, typical applications, economics of operation and special operational characteristics that can be added to the standard package, such as inching, reversing, dynamic braking and multimotor control.

(35) CAR PULLERS—Complete details on the S-A line of car pullers, sheaves, rollers and other accessories are provided in Bulletin 753 offered by Stephens-Adamson Mfg. Co., Aurora, Ill. Application data and features, specifications and dimensions are included for the various units.

(36) ROLLER CHAIN SPROCKETS—Pocket-size Catalog B55-53 listing prices and specifications for Morse Taper-Lock stock roller chain sprockets now is available from the Morse Chain Co., Detroit 10, Mich. Covered are horsepower ratings, Taper-Lock bushing and sprocket specifications and prices, and roller chain and part specifications and prices for ½-, ⅝-, ¾-, 1- and 1¼-in-pitch chain. Installation and removal procedures for Taper-Lock sprockets are listed in the catalog as well as horsepower-selection charts, drive-selection procedures and service-factor tables.

(37) DISTRIBUTION TRANSFORMERS—Wagner Electric Corp., St. Louis 14, Mo., offers Bulletin EU-106, No. 12, which describes in detail the new Wagner line of dry-type distribution transformers. The units described are Class B-insulated 80-C-rise dry-type transformers, in ratings 3 through 100 kva, single-phase, 600 v and below, and feature Wagner Form W construction, with cores of cold-rolled oriented grain steel. In the redesigned line, size and weight have been reduced to provide maximum ease of handling and installation, the company points out.

(38) POWER SHOVELS—12-p Bulletin 55570-3 now available from the Thew Shovel Co., Lorain, Ohio, fully describes the Lorain "80" Series of power shovels and cranes in the 1¾-yd class. It covers design and construction features, with varied job applications illustrated, and describes the choice of crawler sizes and front-end equipment.

(39) MOTOR STARTERS—Design and operation features of Allis-Chalmers Type H starters built to control squirrel-cage, synchronous, wound-rotor and multispeed motors in ratings from 2,200 to 5,000 v are described in detail in a new 12-p Bulletin 14B6410B released by Allis-Chalmers Mfg. Co., Milwaukee 1. The starters, in ratings up to 3,000 hp at 5,000 v, are available with air or oil contractors, depending upon applications.

(40) WINCHES—Bulletin 853 from Stephens-Adamson Mfg. Co., Aurora, Ill., provides detailed application data, specifications and dimensions on four types of motor winches and five sizes of hand winches with pull capacities from 500 to 3,000 lb.

(41) DRIERS—Bulletin D4-B3, released by the Denver Equipment Co., Denver 17, Colo., emphasizes features of the Denver "Standard" drier, complete installation from burner to stack, dependable drives, rugged tires, functional flights, sturdy thrust rolls, positive seals, and controlled burners. Typical drying data is given for various materials in driers from 2 x 12 ft to 10 x 100 ft in size.

(42) DISCONNECTING SWITCH—The PMB-236 switch for group operation, modernized with many new features, is described in Publication 5305 from Delta-Star Electric Div., H. K. Porter Co., Inc., Chicago 12. A low-cost, single horizontal break switch featuring simplicity, compactness and ease of operation, the switch is available in all standard voltage ratings from 7.5 kv, 400 amp, to 161 kv, 1,200 amp.

(43) METALIZING—Folder on the application, uses and benefits of metalizing, offered by the Protective Coatings Div., Metalweld, Inc., Scotts Lane & Abbottsford Ave., Philadelphia, Pa., details its many applications. The folder also contains a description of the process itself as well as important data on a new spraying technique said to save considerable time and permit jobs that could not be done before.

(44) SMALL CIRCUIT BREAKERS—A new "Quicklag" circuit-breaker panelboard is described in Booklet B-5644 available from the Westinghouse Electric Corp., Box 2099, Pittsburgh 30. For lighting and appliance branch-circuit application, this plug-in panelboard (Type NPLAB) is less expensive and smaller than a comparable conventional Type NLAB panelboard, the maker reports.

(45) COMPLETE STANDARD NUT AND BOLT DIMENSIONS and thread data originally developed by the Murphy Diesel Co. for the convenience of its own engineering department is now offered as a useful data sheet without charge to anyone interested. Available

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NEW YORK 36, N. Y.

from Murphy Diesel Co., Milwaukee 14, Wis.

(46) FRONT-END LOADER—Complete specifications for the Baker-Lull 4B front-end loader mounted on various models of R. H. Sheppard industrial-type tractors are shown in a catalog sheet available from Baker-Lull Corp., Minneapolis 11, Minn. The literature covers the R. H. Sheppard SDI-1, -2 and -3 series and lists materials-handling tools available with the Shoveloader.

(47) PIPING—Designed to be of help to engineers, designers and others interested in problems of dealing with piping and pressure vessels, new 48-p Taylor Forge publication contains detailed engineering and application data, including bases for establishing stress values, ASME codes, dimensions, etc. Offered by Taylor Forge & Pipe Works, Chicago 90.

(48) SPEED REDUCERS—15-p Booklet B-5646 describing the complete line of Westinghouse speed reducers is offered by the Westinghouse Electric Corp., Box 2099, Pittsburgh 30. Covered are the operating features and applications of the equipment, with details of the standard ratios available for all types and units for right-angle drives and inline drives.

(49) AIR COMPRESSORS—Condensed specifications and features of the complete line of Davey portable air compressors are contained in Form E-247 from the Davey Compressor Co., Kent, Ohio. Covered are gasoline, diesel and electric units from 60 to 600 cfm, in skid, 2-wheel and 4-wheel design.

(50) BLOWERS—Billmyre Blower Div., Lamson Corp., Syracuse 1, N. Y., offers 32-p Bulletin B-6 with information on centrifugal blowers and exhausters for air or gas handling. Performance data is presented for air blowers and exhausters ranging from 1 to 7 psi; and gas blowers or boosters for gas pressures from ½ to 6 lb. Technical and engineering data for blower applications are given, as well as altitude- and temperature-correction factors, pressure equivalents, and friction-loss and velocity tables.

(51) UNIT HEATERS — The versatility of the modern unit heater is illustrated in a new 12-p bulletin of photographs which shows a wide scope of commercial, industrial and institutional heating installations, and unusual spot-heating applications. Designed to graphically assist the designer in solving heating problems by displaying solutions where comfort, economy and floor-saving have been accomplished, Bulletin 14 is offered by the Industrial Unit Heater Association, Detroit 26, Mich. The association also offers its Bulletin 12, entitled "The Care and Maintenance of Steam and Hot-Water Unit Heaters."

(52) CHAIN HOISTS—The "Pul-Lift," a chain-hoist design which either hoists or pulls, is described in Bulletins P-260B and P-1260 offered by the Materials Handling Div., Yale & Towne Mfg. Co., Philadelphia 15. Developed as a general purpose tool, the Pul-Lift operates in close quarters by short strokes on a ratchet handle and is available in ¾- to 15-ton capacities.

(53) BRASS RODS, fabricated parts and other brass products maintained in Titan's mill depots at Bellefonte, Pa., and Indianapolis for quick delivery to warehousers, distributors and users are listed in a folder available from the Titan Metal Mfg. Co., Bellefonte, Pa. Included are brass and bronze free-cutting rods, extruded brass shapes, bronze welding rods, brass pressure die castings, brass and bronze forging rods, and forgings, brass cold heading wire.

(54) MACHINERY MOUNTINGS—Barry Bulletin R-536 tells how to choose between shock mounts and vibration isolators, explains how the two act to protect mounted equipment, and shows why maximum shock and vibration protection are not normally provided by a single mounting. Typical applications for shock mounts and vibration isolators are illustrated. Available from the Barry Corp., Watertown 72, Mass.

(55) MECHANIZED BOOKKEEPING with the new Remington Rand low-cost bookkeeping machine which, with one writing, posts all records, entering each charge or credit simultaneously on all records, with perfect agreement, is described in Booklet AB848. Applications include accounts receivable, accounts payable and payroll records. Booklet from Remington Rand, Inc., New York 10.

(56) COUPLERS — Snap-Tite, Inc., Union City, Pa., offers catalog on its line of "Hi-Flow" quick connect-disconnect couplers featuring up to 80% flow, and reduction in weight, and available in sizes from ¼ through 8 in and greater for use with air, water, oil, gas, steam and most chemicals.

(57) WELDING HOSE—Bulletin offered by Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia 24, describes the types of Quaker welding hose, with constructions, performance data, recommended uses, sizes, etc.

(58) SOCKET SCREWS — Standard Pressed Steel Co., Jenkintown, Pa., offers a folder on its Unbrako socket screw products, including socket-head cap screws, button-head socket screws, etc. shoulder screws, flat-head socket cap screws button-head socket screws, etc.

(59) FASTENERS—Wall chart provides in quick reference form descriptive, dimensional and engineering data on a number of Huck fasteners, including aircraft lockbolts, commercial lockbolts, blind lockbolts and blind rivets. Available from Huck Mfg. Co., Detroit 7.

(60) MOISTUREPROOF WALLS—Flexrock Co., Philadelphia 2, offers a bulletin on Flexseal, an inorganic water repellent designed for brick, concrete, sandstone, stucco, asbestos-cement combinations, cement-base paints and other composition surfaces, and said by the maker to penetrate the masonry up to ¼ in, lining each minute particle of the masonry structure with silicone resins but not plugging the pores.

(61) TRUCK CRANE—Bulletin TCR-201 with full operating data and specifications on its 6-ton ⅝-yd Model T-35 truck crane for 2½- and 4-ton truck mountings is available from the Schield Bantam Co., Waverly, Iowa.

(62) COMPRESSORS, PUMPS—Bulletin 546, from Pennsylvania Pump & Compressor Co., Easton, Pa., describes its line of air and gas compressors, Oilfreair and Oilfregas compressors, dry vacuum pumps, aftercoolers, Airchek valves and centrifugal pumps for boiler feeding, general power plant and industrial applications, with capacities and sizes.

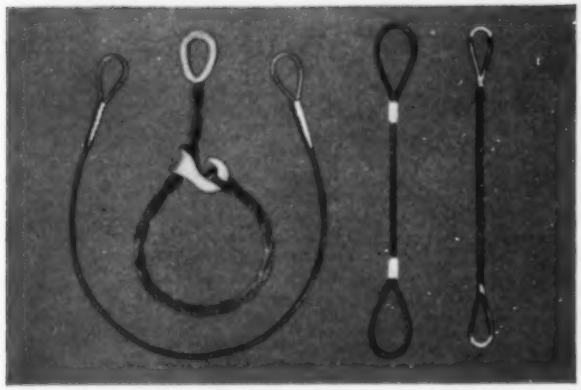
(63) INDUSTRIAL CONTROLS—Catalog 8305 describes and illustrates non-indicating electric, electronic and pneumatic controllers for temperature, pressure and humidity, also pneumatic and electric valves, switches and relays, with specifications and application data. From Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia 44.

PREFORMED INTERNALLY LUBRICATED

Wire Rope

for cranes, hoists, elevators, and all equipment

From Macwhyte's complete line of a thousand and one sizes and types, you get the right rope for your equipment. Thoroughly lubricated, PREformed, engineered to give long, low-cost service. *Send for Catalog G-15.*

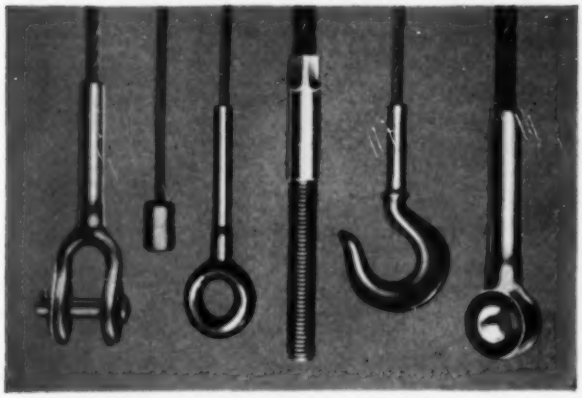


WIRE ROPE

Slings

for lifting and moving materials, equipment in production or maintenance

There are hundreds of types and sizes of Macwhyte Round-Braided, Flat-Braided, Single-Part, and Grommet Slings. All are custom made in length, capacity, and flexibility to meet your needs. *Send for Catalog S-8.*



WIRE ROPE

Assemblies

for machine parts, controls, and operating devices

Macwhyte Safe-Lock wire rope assemblies are made to order in length, strength, and flexibility desired. Terminals are permanently attached to one or both ends. There are many standard types. *Send for Catalog 5201.*

MACWHYTE

10x8-53

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MACWHYTE COMPANY

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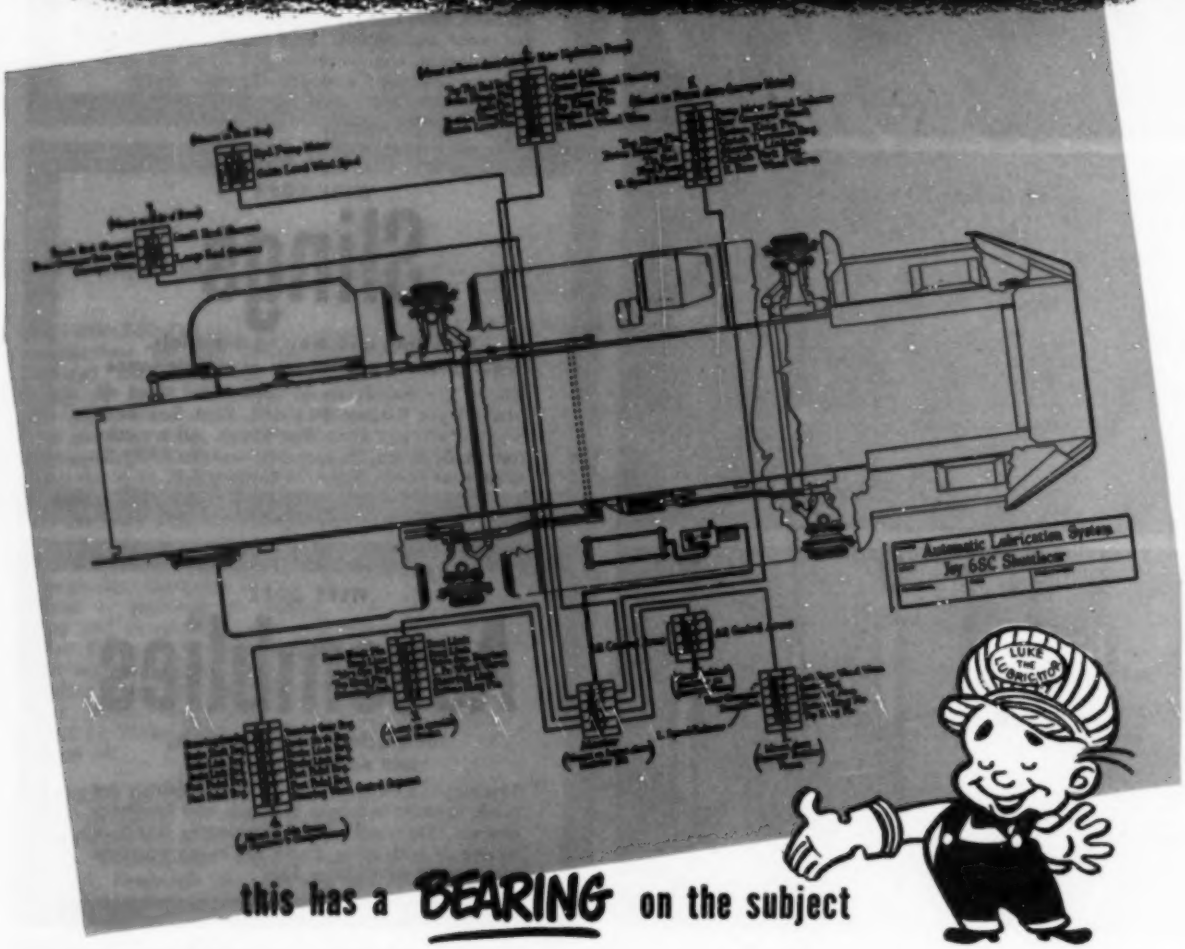

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News Round-Up

News Briefs and Trends

Imports Replace 34 Million Tons of Coal; Fight Continues

Foreign residual oil imports in the first 6 mo of 1953 totaled 3,617,000 bbl more than in the corresponding period of 1952, or an increase of 5%, according to a study released last month by the National Coal Association. Residual imports for the 6 mo were equal to 17,171,000 tons of coal and the increase over the 1952 period the equivalent of 867,000 tons of coal, the NCA pointed out. If imports are maintained at the same level during the last half of 1953, foreign residual will displace more than 34 million tons of coal during the year, or almost 3 million tons more than during 1952.

Continuation of the campaign to obtain legislation imposing a quota restriction on imported residual oil was voted at a joint meeting of the Special Committee on Natural Resources of the NCA and the Foreign Oil Policy Committee held in Washington Sept. 10. The meeting was the first held since Congress adjourned without passing the legislation sought and the committees were unanimous in approving the campaign carried out during the session. Plans for a program during the next session of Congress, with even more emphasis and a broadened basis, will be formulated by a special committee appointed for that purpose.

State Pumps to Start Large Anthracite Drainage Project

As the first step in a large-scale dewatering program for the anthracite region, the Pennsylvania Department of Mines expects to have four deepwell pumps operating in the Wyoming Valley by early December, it was announced late in August. Three pumps with a capacity of 20,000 gpm will be installed at the Twin shaft property, Duryea, and one pump with a capacity of 10,000 gpm at the Exeter shaft, Exeter. The equipment is expected to cost about $300,000 and will be financed under a $1,500,000 appropriation approved by the 1953 Legislature. Cost of the installation and maintenance of the pumps will be shared by the Pennsylvania, Hudson, Glen Alden and Lehigh Valley coal companies. The state funds will serve as a stopgap until Congress is ready to provide federal funds for the construction of a 137-mi drainage tunnel to empty the region's water into the Susquehanna River. The tunnel would cost $400 million, according to estimates, and would require at least 5 yr to build. If the initial project is successful, the program will be extended to other anthracite fields, W. J. Clements, Pennsylvania Secretary of Mines, reported.

Glen Alden Pushes Program, Installs Continuous Miner

Glen Alden Co. is "spending more on equipment this year, some $3 million, than was expended in the 12 yr since 1940," Francis O. Case, company president, told a group of financial editors last month. Speaking before a dinner meeting of Glen Alden dealers in Wilkes-Barre Sept. 15, Mr. Case also discussed changes in mining methods and policies, including installation of a Joy continuous miner and erection of fine-coal facilities that will raise the company's capacity for small sizes to 50,000 tons monthly.

Tests of the miner, the second such unit ever used in anthracite, were scheduled to begin last month on the

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Coal Age Trophies For Safety Champions

CHAMPIONSHIP TEAMS at the 14th National First Aid and Mine Rescue Contest, being held in Ft. Wayne, Ind., Sept. 29-Oct. 1, will receive, among other awards, these engraved sterling-silver trophies presented by *Coal Age*. Since the first of the contests *Coal Age* has been donating first-prize trophies and again this year feels it a privilege to join with other national organizations in honoring the first aid and mine rescue champions. A full report on the Ft. Wayne contests will appear in November *Coal Age*.

UMWA Fund Spent $138 Million in Year, Has Reserve of $92 Million, Report Shows

Expenditures of the UMWA Welfare and Retirement Fund totaled $138,963,949.52 during the fiscal year ending June 30, 1952, according to the fund's annual report released early last month. Income for the year totaled $131,482,786.55, consisting of royalty payments by operators of $129,690,366.43 and interest on government securities of $1,792,420.12. As of June 30, the fund had an unexpended balance of $92,024,732.16. A year earlier, the unexpended balance had stood at $99,505,895.13.

During the year, the fund reported, benefits in bituminous coal mining areas totaled $135,110,228.69, or 97.2% of all expenditures. Some 266,421 beneficiaries were aided, receiving 394,528 separate benefits and services. All administrative costs, for the Washington and 10 area offices, added up to $3,853,720.83, or 2.7% of the total expenditures.

As of June 30, pension payments were being made to 50,055 retired miners, and pension benefits for the year amounted to $58,945,707. During the fiscal year, 6,706 pensions were authorized, as compared with 8,139 in the previous year. Expenditures of $56,444,330 provided 2,325,921 days of hospital and medical care for 230,678 cases.

Rehabilitation and maintenance aid cash benefits totaled $9,158,817, and were paid to 35,015 beneficiaries, totally disabled miners and their families. Widows, orphans and other dependents of deceased miners, totaling 40,578, received $10,456,086. Disaster benefits totaled $105,289.

Carbide & Carbon Ships Coal Chemicals From New Plant; Cited for Coal Research

The first shipment of a new chemical derivative from coal from the coal-hydrogenation plant of the Carbide & Carbon Chemicals Co., at Institute, W. Va., was announced by the Union Carbide & Chemicals Corp. Div. Sept. 4. The chemical, a high-boiling phenol, was shipped to a resin manufacturer but, the company points out, it has other uses, such as for upgrading lubricating oils, for disinfectants, pharmaceuticals, etc.

The recently opened Institute plant, built at a cost of $11 million, was designed to process 300 tons of coal a day but may easily be expanded to handle over 500 tons daily. Production of phenol is only one step in Carbon & Carbide's plans to make a long list of coal chemicals. Developed during 17 yr of research at a cost of $20 million, the company said, its process "will free the fast-growing U. S. chemical industry from dependence on the steel industry's coke ovens for much-needed coal chemicals that form the basis of many important plastics, synthetic rubber, dyes . . ."

For its outstanding program of research and development, Carbide & Carbon Chemicals Co. has been named for the "1953 Award for Chemical Engineering Achievement," an annual award made by *Chemical Engineering*, a McGraw-Hill publication. Presentation of the award to top company officials will be made at a dinner in Philadelphia Dec. 2 during the Exposition of Chemical Industries. The company was similarly honored 20 yr ago and is the first firm to win the award a second time. It was also cited in two group awards made in previous years. (*For detailed description of Carbide & Carbon's coal-hydrogenation plant and program, see "Coal for Chemicals," Coal Age, October, 1952, pp 70-75.*)

1,400-ft level of the No. 4 shaft of the company's Loomis colliery. In talking to the financial editors, Mr. Case said that new breakers, mining equipment and other facilities would pay for themselves at the rate of 30 to 40% a year and also that "operational costs will go down because of the more co-operative spirit of the UMWA."

Glen Alden also has begun to rebuild and open industrial markets that should offset losses of household markets, he reported, predicting that 40% of its production this year would go to industrial uses, compared with 20% last year. Speaking of the industry in general, Mr. Case said: "Anthracite probably will have a few more years of tough sledding. Realistic thinking and planning, however, together with some basic changes in the fuel picture should combine to brighten the industry's picture considerably."

Earlier in the month, the company had announced the closing of three of its operations as a part of its consolidation of workings as previously planned. Involved were the Truesdale colliery and breaker, the No. 20 tunnel, and the Bliss colliery and breaker, employing some 1,066 men. Their closing will not restrict Glen Alden's output, however, as additional working time can be provided at other collieries, the company pointed out.

Bituminous Output Inches Up

Bituminous production for 1953 through Sept. 12 totaled 314,605,000 tons, a decrease of only 2.5% from the same period of 1952, according to USBM figures. A month earlier, 1953 output to Aug. was 3.8% under the 1952 tonnage for the same period. Production for the week ending Sept. 12, 1953, which included the Labor Day weekend, was 8,115,000 tons. In the comparable week of 1952, which did not include Labor Day, output was 11,847,000 tons. Anthracite production for the year through Sept. 12, 1953, was 20,708,000 tons, 25.2% under the 1952 tonnage for the same period. Up to Aug. 15, 1953 anthracite was 25.6% behind last year. Through Sept. 5, 1953, it had trimmed its loss from 1952 to 24.3% but fell behind the following week.

New 41-Story Office Building In Chicago to Burn Coal

The new 41-story office building of the Prudential Insurance Co., now under construction on Chicago's lake front and claimed to be "Mid-America's Finest New Office Building," will burn coal, according to an announcement by the building managers last month. It is expected to use 10,000 tons of coal annually for heating alone, and additional coal will be indirectly utilized by a year-around air-conditioning system powered by electricity from the Commonwealth Edison Co. of Chicago, a large coal consumer. The building, planned for completion early in 1955, will utilize spreader stokers under the three 40,000-lb-per-hr steam units and the one 22,000-lb standby unit, and will have the latest auxiliary boiler-room equipment, including automatic combustion controls and automatic mechanical coal- and ash-handling. Coal will be received in railroad cars, unloaded at an underground coal dock beneath the street.

Virginia Utility to Expand Coal-Powered Plants

Plans for additions to two of its steam-generating plants that will increase their coal consumption by some 430,000 tons of coal a year have been reported by the Virginia Electric & Power Co. At its Possum Point plant, near Quantico, Va., the company will spend $16 million to expand its capacity by 100,000 kw by August, 1954, and boost its coal consumption from 400,000 to 650,000 tons annually. At the Portsmouth plant, formerly called the Gilmerton station, a $32½ million expansion will increase the present coal consumption of 240,000 tons annually by another 180,000 tons by the end of 1954.

Mine Fatalities Down for 7 Mo

Although there were 38 fatalities in anthracite and bituminous mines in July, as compared with 30 deaths in June, there is a marked improvement in

Hudson Coal Flies Dealers to Tour Mines

THE FIRST of several plane loads of Hudson Coal dealers from Canada are shown on arrival at the Avoca (Pa.) airport for a tour of the company's mines, breakers and stripping operations. The tour was a part of the company's program of familiarizing its dealers with its operations and problems and included a banquet at the Hotel Sterling in Wilkes-Barre. Arrangements for the invitation of these dealers to the anthracite area as guests of The Hudson Coal Co. were made by F. P. Weaver Coal Co., Ltd., of Toronto, Hudson distributors in Canada.

EATON TANDEMS— the most economical units available for increasing payload in proportion to gross weight

EATON AXLES — The load-carrying and moving components — are performance-proved by thousands of units and millions of miles of service. They are installed in the position for which designed and, therefore, are not subject to abnormal stresses or to unnatural lubricating problems.

- The single drive line permits a natural angle and direct lead of the propeller shafts; eliminates excess parts; simplifies maintenance.
- The power divider, of simple design, assures the transmission of power equally to both axles.
- A third differential in the power divider assures equalized power transmission to the driving wheels even though wheel speed may be variable due to road irregularities or differences in tire diameter.
- The differential lock between forward and rear axles (optional on some models) is positive in action. With unfavorable road conditions such as mud, snow, and ice, this feature makes maximum traction available when required.

Let your truck dealer explain how Eaton Tandem Drive Axles will give your trucks greater load capacity and at the same time reduce tire maintenance and operating costs.

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CURTIS W. McGRAW

Everybody who knows COAL AGE has known Curtis McGraw, president and chairman of the board of the McGraw-Hill Publishing Co. The enduring mark of his leadership in the task of keeping business well-informed, shaping the technical development of industry, and holding the nation to an awareness of its power for greatness and goodness must remain on these pages. But it is something out of the lives of all of us that he died last month.

Mr. McGraw, whose home was in Princeton, N. J., was the third son of the late James H. McGraw Sr., founder of this publishing company, and of Mrs. Mildred Whittlesey McGraw of Madison, N. J., who survives him. Three brothers, Harold W. McGraw, James H. McGraw Jr., and Donald C. McGraw, also survive. D. C. McGraw is vice-president of McGraw-Hill Publishing Co.

Born in Madison, N. J., Oct. 13, 1895, Mr. McGraw was a graduate of the Lawrenceville School, and of Princeton University, class of 1919. At Princeton, he was president of his freshman class, captain of his varsity football team in 1919 and was active in basketball and other sports. He was a major of infantry in World War I and saw foreign service in the Artois sector and Meuse Argonne offensive.

Associated with McGraw-Hill Publishing Co. since 1920, when he joined the McGraw-Hill Book Co., a subsidiary, Mr. McGraw was vice president, treasurer and director of the book company from 1927 to 1950. He became vice president and treasurer of the McGraw-Hill Publishing Co. in 1943, and in February, 1950, was elected president and chairman of the board.

Mr. McGraw was active in numerous civic affairs, and was a member of the Postmaster General's recently appointed Advisory Board of the Post Office Department. He was a past director and past president of the American Book Publishers' Council.

He was also a director of the First National Bank of Princeton, the Dragon Cement Co., the Princeton University Press, of which he was treasurer; the Princeton Hospital, of which he was president, and the Magazine Publishers' Association. He served as a member of the Princeton Zoning Board from 1919 to 1952.

Mr. McGraw was a member of the Advisory Board of the Times Square Branch of the Chemical Bank & Trust Co., a member of the Men's Committee of The Lighthouse, New York Association for the Blind, the Men's Committee of the American Museum of Natural History, the National Association of Manufacturers, the National Society for Crippled Children and Adults, Inc., of which he was a trustee at large, the New Jersey Republican Finance Committee, United States Golf Association, and of the National Committee of the William the Silent Award for Journalism.

An Editorial

Reprinted From the Sept. 11, 1953 issue of The New York Herald Tribune

Curtis Whittlesey McGraw

The modern industrial society must be fed by streams of information, objective, expert and complete. It needs facts about all its separate parts—technical facts which may be wholly outside the layman's understanding and yet are charged with life and drama to those who make the multitudinous decisions of a free economic system. The McGraw-Hill Publishing Co. has been a principal supplier of these facts. Its books, magazines and directories, sold not only in this country but across the world, have almost as important a role as oil or steel in shaping technical development.

Curtis Whittlesey McGraw, who died yesterday, had presided with imagination and skill over the wide-ranging enterprises of the McGraw-Hill company. Virtually his whole life was given to the work which his father had shared in founding. He was always ready to take part in civic enterprises, but the company itself is undoubtedly the memorial by which he would want to be remembered. As outward symbol of his contribution there stands at the west end of 42nd St. the famous building designed by Raymond Hood, a landmark in the city. But in factories and industries without number there is some part attributable to the facts and information which poured forth through the enterprise of his company.

---

fatality rates for the first 7 mo of 1953 over the same period of 1952, according to USBM figures. During the 7 mo of 1953, a total of 266 men were killed in U. S. coal mines, compared with 338 in the 1952 period, for rates per million tons of 0.97 and 1.16, respectively. In bituminous mines, 220 men were killed in 1953 for a rate of 0.85, as against a rate of 1.00 last year. The 1953 rate of 2.64 fatalities per million tons for anthracite is based on 46 deaths and compares with a rate of 3.05 last year. The absence of anthracite fatalities in underground, surface or strip haulage made July the seventh straight month in which there have been no deaths attributed to these causes.

New Automatic Units Put in Use to Burn Anthracite

The latest innovation in the automatic use of anthracite fuel was scheduled to begin operation last month for the first time in New Jersey, Hugh O. Tompkins, managing director of the Fuel Merchants Association of New Jersey, announced. The "Fire Jet," newest development of industry research in anthracite-burning equipment, was to be installed in a 16-family apartment house in East Orange. In Northern New Jersey, a school and a green house were to the state's first users of the Cross-Feed stoker, another modern burner for the commercial-school-apartment house class.

In New York City, the first Fire Jets were being installed in two Post Office substations, The Losch grate, another modern anthracite stoker for larger buildings and multiple family dwellings, began operation in apartments in the Bronx and Brooklyn, among other places. Specially designed to bring the economies and advantages of anthracite to the operators of large buildings, the Fire Jet is produced by the Electric Furnace-Man, Inc.; the Cross-Feed stoker by the Motor Stoker Div. of the Hershey Machine & Foundry Co.; and the Losch grate by the Losch Boiler Sales Co.

MORE BRIEFS on p 180

JOY PLUGS

NO. D3A375RM Male

MINING'S CHOICE *for* PORTABLE POWER TRANSMISSION

Modern mining technique permits no pampering of men or equipment. From power source to working face, everything must keep pace with production schedules. That's why it's important to *you* that more JOY connectors are used in mining operations than all other brands combined.

This proves that JOY plugs, receptacles and distribution boxes "measure up" to the industry's high standards for performance, safety and durability.

JOY plugs are molded to cable as one-piece Neoprene units—shatter-proof, wear-resistant, and impervious to the deteriorating effects of moisture, grime or oil. Through them, power cable can be sectionalized into easily handled lengths for rapid replacement of damaged sections.

JOY plugs are supplied for A.C. or D.C. operation in current capacities as required. They are available in three or four-contact models, described below, and also with one or two conductors. • Write for complete details and bulletin today!

3-CONDUCTOR DESIGNS *(for D. C. Application)*

REVERSED PIN PLACEMENT: Male plug has one socket that engages contact pin in female plug for grounding and polarization. Supplied for #10 through 750 MCM wire sizes.

PILOT PIN DESIGN: As above except for two additional "pilot control" contacts that may be shunted or carried through cable on #10 wire. Supplied for #8 thru 500 MCM wire sizes.

4-CONDUCTOR DESIGNS *(for A. C. Application)*

REVERSED PIN PLACEMENT: Male plug has one socket that engages contact pin in female plug for grounding and polarization. Supplied for #10 through 500 MCM wire sizes.

PILOT PIN DESIGN: As above except for two additional "pilot control" contacts that may be shunted or carried through cable on #10 wire. Supplied for #10 through 400 MCM wire sizes.

IMPORTANT: Pilot pin designs are *permissible* when used with JOY Safety Circuit Center power distribution boxes. *Write for complete details.*

NO. D3A375RF Female

Straight Pin Bigun (SPB) plugs illustrated at top and left are JOY's three-conductor style with pilot contact. Note reversed contact for polarization and grounding.

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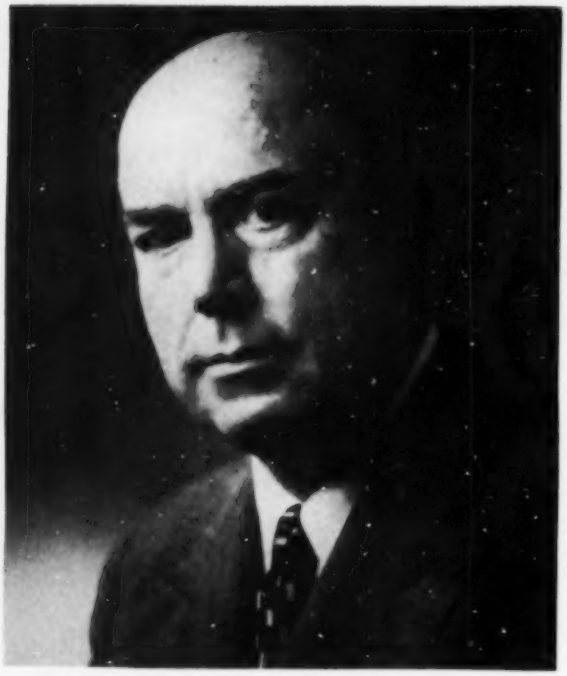


D. C. McGraw Heads McGraw-Hill

Donald C. McGraw was elected president of the McGraw-Hill Publishing Co., Inc., Sept. 17, succeeding his brother, the late Curtis W. McGraw.

The youngest son of the late James H. McGraw Sr., company founder, Mr. McGraw has been associated with the company since 1919, a director since 1935 and vice president since 1945.

During World War II, he was a consultant to the Publishing and Printing Division of the War Production Board. He is a graduate of Lawrenceville School and attended Princeton University. During World War I, he served with the U. S. Navy.

Mr. McGraw joined McGraw-Hill in 1919 as a member of the advertising staff of *Chemical & Metallurgical Engineering*. Two years later, he transferred to the pressroom and composing room. In 1924, he assumed supervision of the operation of the McGraw-Hill building and of the printing plant then owned by the company.

Since 1933, when he was made secretary of the company and put in charge of production and manufacturing, he has been responsible for the handling of all contracts for printing and binding, engraving and paper supply for the entire McGraw-Hill operation. Mr. McGraw in 1945 was named vice president for manufacturing and general services, the position he has held until now. In 1950, he became a director of the McGraw-Hill Book Co., a subsidiary, and of the Newton Falls Paper Mill in which McGraw-Hill has a half-interest. Other officers of the McGraw-Hill Publishing Co. remain unchanged.

Mineral Producers Discuss Legislation, Auger Mining and Taxes at Annual Meet

LEGISLATION and the coal industry, highwall auger mining and the Pennsylvania sales tax were topics at the 10th annual meeting of the Mineral Producers' Association held at the William Penn hotel, Pittsburgh, Sept. 17. Over 100 members and guests attended the event.

The annual dinner, which followed a reception given jointly by the Atlas Equipment Corp., Beckwith Machinery Co., Highway Equipment Co. and Frank Swabb Equipment Co., was greeted by Alan R. Davidson, Twin River Co., chairman of the association, who introduced the toastmaster, W. C. Altvater, vice president, Pittsburgh & Shawmut Coal Co. Mr. Altvater introduced outstanding guests including directors of the association, members of the state legislature, state officials and railroad officials. Also presented to the group were various state mine inspectors in attendance.

Principal speaker at the dinner was Harry Stuhldreher of the United States Steel Corp., famed quarterback of Notre Dame's famous "Four Horesmen", whose topic was "Put Something Back". Using football as a background and many personal experiences as examples, Mr. Stuhldreher emphasized the role of group sports in molding character. The desire to win as a team or group rather than seek personal recognition was described as the type of spirit that puts something back.

The afternoon session following the membership luncheon and annual business meeting featured as speakers: Matthew A. Crawford, general counsel, Mineral Producers' Association, who spoke on "1953 Legislation and the Coal Industry", Donald M. Bondurant, vice president, Compton, Inc., who discussed "Highwall Auger Mining"; and E. D. Odenbaugh, corporation tax examiner, Bureau of Corporation Taxes, Pennsylvania Department of Revenue, who was introduced to the group by George H. Gleeson, district supervisor, Sales Tax Division, Department of Revenue. Mr. Odenbaugh discussed "The Pennsylvania Sales Tax". F. H. Mohney, executive secretary, Mineral Producers' Association, presided at the afternoon session.

LEGISLATION

In discussing legislation recently passed by the Pennsylvania Legislature, Mr. Crawford pointed out that it had been kind to industry in that it had not passed several laws that would have made operating difficult for many companies. As examples, he cited the proposed increase in bond requirements and the original bill on backfilling. The latter was amended and presented on a more reasonable basis. Senate Bill 91 relative to backfilling near highways amends the present open-pit statute and requires coal operators to backfill areas within 15 ft. of the boundry line of highways. It further provides that slopes shall not exceed 40 deg. Authority to prescribe when backfilling is to be made is vested in the Pennsylvania Department of Mines, he added.

Mr. Crawford then discussed H. B. 1570 which transferred all powers and duties of the Department of Forest and Waters in connection with strip mining to the Department of Mines. This law is merely a transfer of powers with no new amendments.

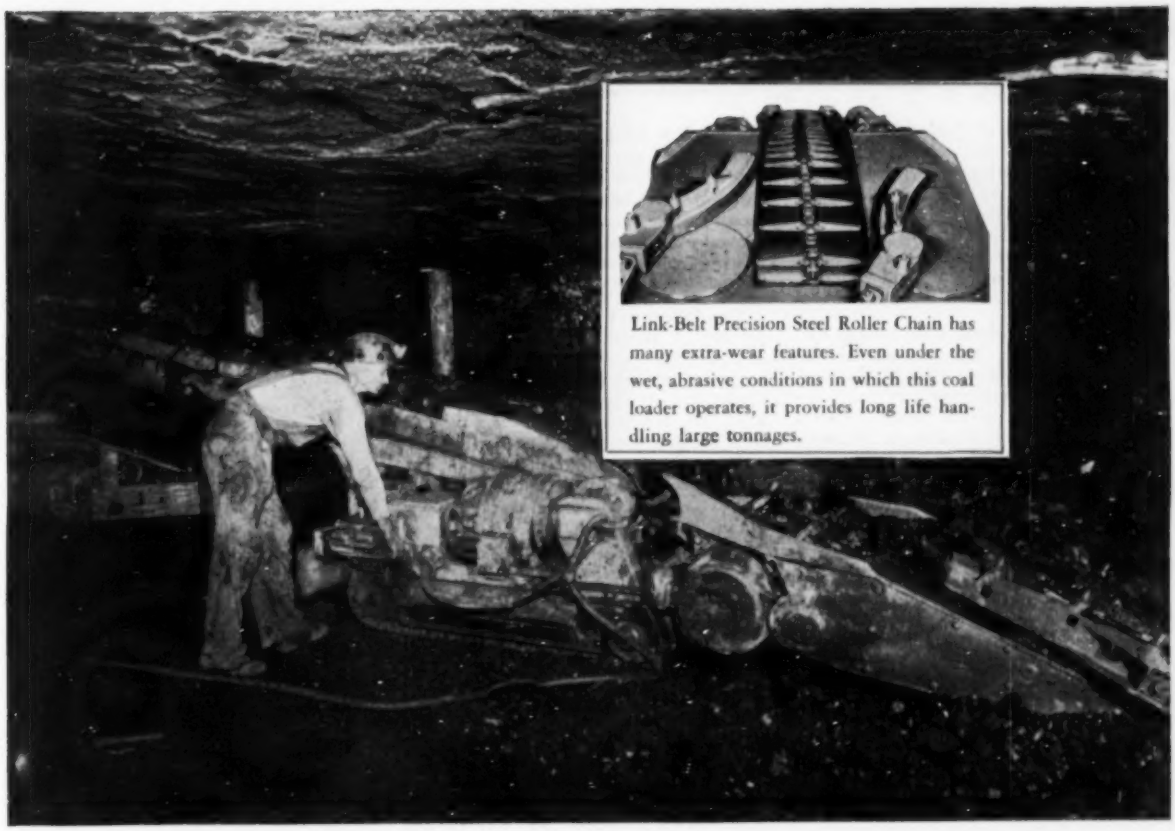
Amendments to the Workmen's Compensation and Occupational Diseases Laws affecting the mining industry were next covered. The act was amended by two bills which provide for an increase in payments to $32.50 per week for disability and an increase in the period of participation from 300 to 350 wk. The other amendment changed the provision on medical and surgical benefits, making them payable regardless of earning power, Mr. Crawford explained.

Outstanding changes in the Unemployment Compensation Law were permission to assign overpayments in 1945 to later obligations, but such credits are not transferable. The other change noted was an increase in fees for companies handling explosives and using large boilers.

AUGER MINING

In tracing the development of highwall auger mining, Mr. Bondurant stressed that high-capacity augers are the result of a need for lower production cost. Many low-cost strip-mine properties have been depleted and owners are

(*Continued on p 164*)



Link-Belt Precision Steel Roller Chain has many extra-wear features. Even under the wet, abrasive conditions in which this coal loader operates, it provides long life handling large tonnages.

What is the right chain for your drive or conveying job?

Typical chains from the complete LINK-BELT line

Ewart Detachable Link-Belt, in malleable or Promal, for drives and power transmission.

Class H Pintle chain—excellent for conveyors that slide because of broad wearing surfaces.

Malleable roller chain for conveyors or inclined elevators where reduced chain pull is desired.

Rivetless chain of forged steel, flexible in both planes, is used for flight and drag conveyors.

You'll find the answer in LINK-BELT's complete chain line... a size and type for every need

WHETHER it's a high-hp, heavy-impact drive or relatively slow-speed conveying service—you can get the *one* chain that best meets your needs from Link-Belt's complete chain line. Our engineers will be glad to work with you—help you select the right chain for your requirements. And you can be sure that any Link-Belt chain you buy is quality-built for longer life.

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LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,200

Personal Notes

Joseph Craggs of Taylorville, Ill., has been named field superintendent in charge of operations, Taylorville Div., Peabody Coal Co., succeeding the late **Lynn A. Trovillion. Coil Whitlow,** mine manager, No. 10 mine, has been named mine manager at No. 14 mine, Du Quoin, Ill., succeeding **R. McPhail,** retired.

Pittsburg & Midway Coal Mining Co., Pittsburg, Kans., has announced the following appointments: **H. H. Spencer,** vice president and treasurer, has been named chairman of the board. **Edwin R. Phelps,** general production manager, has been appointed vice president in charge of operations. **H. J. Hofmeister,** assistant secretary and assistant treasurer, has been named treasurer. All three were named to the board of directors.

Robert M. von Storch, superintendent, Loree colliery, The Hudson Coal Co., Scranton, Pa., has resigned from the company to assume the post of superintendent of a coal property of the United States Steel Co. in Carbon County, Utah. With Hudson Coal Co. for the past 20 yr, Mr. Von Storch has been succeeded by **William W. Martin,** former assistant superintendent of Olyphant and Edy Creek collieries of the company. Mr. Martin joined Hudson Coal in 1926.

Robert G. Elliott, general mine foreman, has been advanced to mine superintendent, Widen mine, Elk River Coal & Lumber Co., Widen, W. Va., succeeding the late John Marple. **Paul Smith,** in charge of the conveyor section, succeeds Mr. Elliott as acting general mine foreman. **Richard Shelton,** shift foreman, has been named acting assistant general mine foreman, and **Stanley Eagle** has been put in charge of the trackless mining and conveyor sections at Widen.

Dr. Wilburn C. Schroeder, assistant director of programming, U. S. Bureau of Mines, has resigned to teach chemistry and chemical engineering at the University of Maryland, College Park, Md. Dr. Schroeder joined the Bureau of Mines as a chemical engineer in 1933, and became assistant chief of the Fuels and Explosives Div. in 1939. In 1945 he was appointed chief of the synthetic liquid fuels branch of that division, and was appointed an assistant director of the Bureau in 1951.

George L. Judy, general superintendent, West Virginia properties, has been promoted to vice president, Consolidation Coal Co. (W. Va.), Div. of Pittsburgh Consolidation Coal Co. A graduate of West Virginia University, Mr. Judy joined Consol in 1945.

John Griffen last month announced his retirement Oct. 1 as preparation and consulting engineer for the McNally Pittsburg Mfg. Co., Pittsburgh, Pa. On his retirement, Mr. Griffen will be available as a consultant on coal preparation in both anthracite and bituminous mining, with offices at 2523 Orlando Dr., Pittsburgh 35, Pa. Mr. Griffen spent many years with anthracite companies developing coal-preparation methods and during the past 20 yr has been primarily engaged on bituminous-preparation problems. During this period he played an active part in the design of a number of the largest modern plants built and many smaller ones, including the largest coal-cleaning plant in Brazil, and also made three trips to the coal fields of Western Europe. He has been chairman of the Coal Preparation Committee of the AIME Coal Div. for 4 yr, and a member for many years, and has contributed various articles and papers to coal publications and the AIME.

Coal Age Editors Advanced

HAROLD DAVIS (left) and A. E. FLOWERS, have been advanced from assistant to associate editors of *Coal Age*. Widely known from their published articles on mechanized mining operations and their travels in the various coal fields of the United States, both Mr. Davis and Mr. Flowers are mining-engineering graduates of Pennsylvania State College. Before joining *Coal Age*, Mr. Flowers was chief engineer of the Clinchfield Coal Corp. and Mr. Davis was assistant supervisor of Mining Extension at Penn State.

Indiana Group Names Secretary

INDIANA Coal Operators' Association, Terre Haute, Ind., has appointed William L. P. Burke (above) secretary and labor commissioner, succeeding the late Harvey Cartwright who had managed the affairs of the Indiana operators for many years. A graduate of Georgetown University in 1939, and Georgetown Law School, Mr. Burke, since the war, has practiced law in Washington, D. C., specializing in labor and industrial relations, and was particularly active in legal affairs of the coal industry.

E. W. Potter, superintendent, Federal No. 1 mine, Coal Div., Eastern Gas & Fuel Associates, Grant Town, W. Va., has resigned to become general manager of the Royalty Smokeless Coal Co., Landisburg, W. Va. He has been succeeded as superintendent at Federal No. 1 by **E. H. Shaw,** formerly production engineer for the Keystone and Maitland mines in McDowell County and Eccles, Helen and Stotesbury mines, in Raleigh County. **C. J. Kirby,** superintendent of Page mine, has replaced Mr. Shaw as production engineer. Succeeding him at Page is **V. A. Hensley,** superintendent of the recently closed Weeksbury mine, which has been sold to the Sizemore Mining Co.

John W. Tieman and **Loy A. Updegraff** have been appointed to the Columbus staff of Bituminous Coal Research, Inc. Mr. Tieman, assigned to domestic-heat-

(*Continued on p 148*)

HAZACORD BULLETIN

HAZARD INSULATED WIRE WORKS • DIVISION OF THE OKONITE COMPANY, WILKES-BARRE, PA.

NEW SHUTTLE-CAR CABLE CONSTRUCTION PUTS "HEX" ON STRAIN..INTERNAL ROTATION..FATIGUE

New, Improved Grounding Conductor Gives HEX-TITE Added Flexibility

Hazacord HEX-TITE Type G, provides extra workability and flexibility in grounded cables. The grounding conductor is composed of many more fine wires protected by a cotton serving that forms a smooth channel through which the ground wire can work.

Special Lubricated Strand

Hazard's processing of the grounding strand permits the conductor to work freely without wear or danger of breakage of the strands. This added workability of the grounding conductor permits sharp bending of the cable without fatigue.

HEX-TITE Conductors Provide Exceptional Heat Resistance

Hazard Performite Heat-Resisting Insulation is used in all HEX-TITE Cable. It is suitable for operating temperatures as high as 75C. It provides a safety margin of about

New Hazacord HEX-TITE Twin Shuttle-Car Cable Promises Longer Lived, Lower Cost Trailing Cable Operation

Resisting internal twisting and slippage, new Hazacord HEX-TITE Twin Cable sets a new standard for trailing cable. Hexagonal insulated conductors provide six plane surfaces to form an extra strong mechanical bond with the protective Hazaprene ZBF Sheath. An open reinforcing braid over the hex-insulation is an additional guard against excessive pulling and dislocation.

Special Adhesive Bond

Hex-insulation in the new Hazacord HEX-TITE is treated with a strong adhesive bonding agent for further resistance to slippage within the sheath. Yet, this adhesive permits removal of the sheath for splicing and repair without tearing or damage to the conductor.

Hazard representatives throughout the mining areas have complete information on new HEX-TITE Twin Shuttle-Car Cable. You can also write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

Tough, Hazaprene ZBF Sheath First with Mine Operators

For real protection, new Hazacord HEX-TITE has the famous Hazaprene ZBF Sheath. It offers superior resistance to flame, oil, acid and mechanical damage. And this sheath is pressure-vulcanized in a continuous metal mold for a smooth, dense surface that resists abrasion and tearing. Proof of mold curing is the full description and official approval number P-104BM embossed in raised letters in the sheath.

Prevents Shorting

The rugged Hazaprene Sheath completely encases each hex-conductor, providing a barrier between power conductors and between power and grounding conductor on Type G. This protective wall prevents shorting when the cable is run over and compressed.

For VERTICAL or *ANGLE* bolting

Republic

MINE ROOF BOLTS

Republic makes two types of roof bolts for either vertical or angle roof bolting. Each type has its proper application depending on the roof strata encountered.

Available with either slotted or threaded ends, Republic Roof Bolts feature all the qualities of the Upson Line of headed and threaded products. Shanks are sturdy and tough . . . threads are clean, sharp and accurate . . . heads are square-faced for snug wrenching.

Shank lengths are available in sizes from 18 inches to 90 inches . . . special lengths on request. Write us for additional information on Republic Mine Roof Bolts.

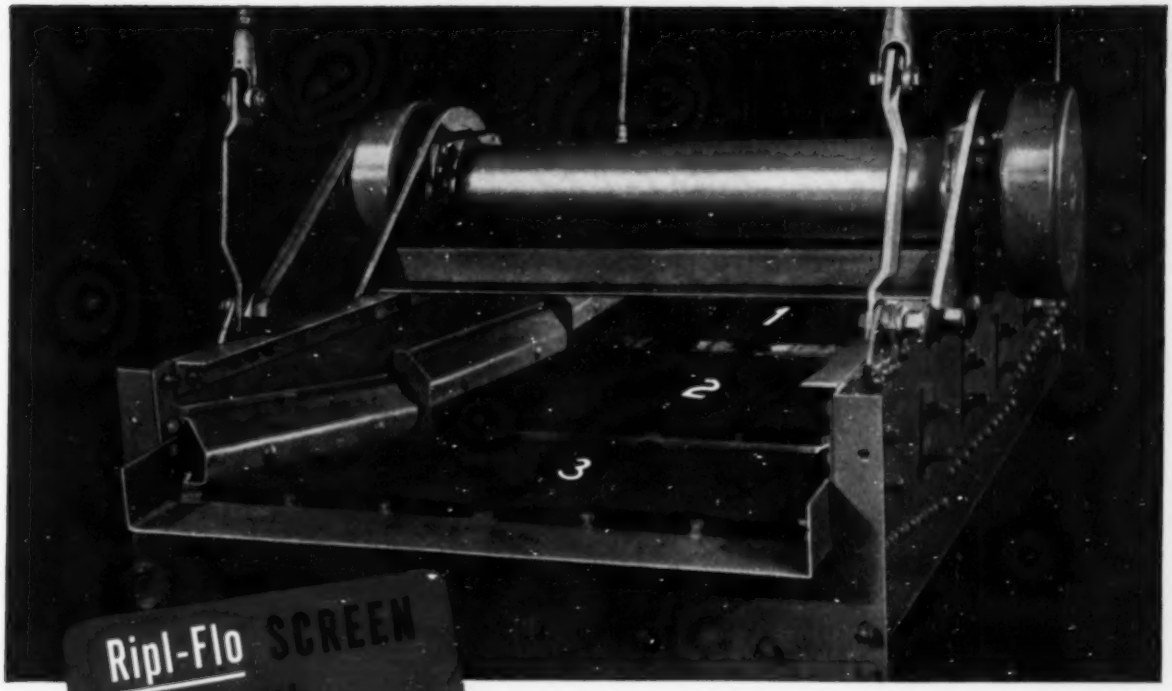
REPUBLIC ROOF BOLT—*A ¼-inch rolled-thread bolt with square-head and forged washer for additional bearing surface. May be used in combination with roof channels, roof ties, roof plates or angle washers.*

REPUBLIC SLOTTED ROOF ROD—*A one-inch rolled-thread rod with slotted end to take wedge. Furnished with hex or square nuts and various size roof plates.*

REPUBLIC STEEL CORPORATION
Bolt and Nut Division • CLEVELAND 13, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC *Upson Quality* BOLTS AND NUTS

Other Republic Products Include Machine, Tank and Carriage Bolts • Lag and Cap Screws • Track Bolts and Spikes • Pipe, Sheets and Wire

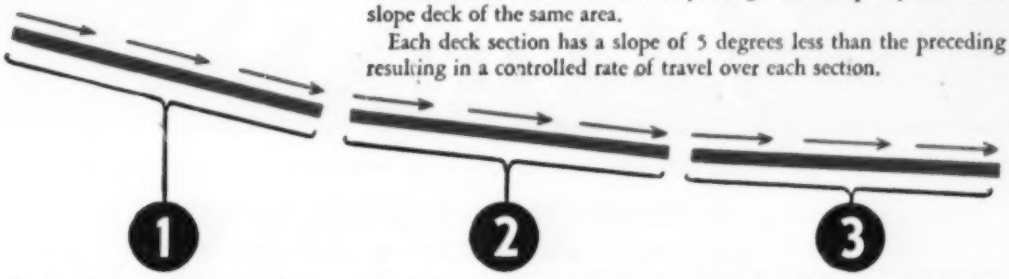


Ripl-Flo SCREEN with Tri-Slope DECK

Screens Moist Fine Coal

NO EXCESSIVE BLINDING and no shut-downs to clear the screen! With the "Tri-Slope" deck you can screen moist ½ x 0 to ¼ x 0 coal with 5% surface moisture at 10 mesh. And you'll get more capacity than with a single slope deck of the same area.

Each deck section has a slope of 5 degrees less than the preceding section, resulting in a controlled rate of travel over each section.



Moist, fine coal passes rapidly over the feed end section to reduce the depth of the bed.

The coal is retarded on the intermediate deck to maintain proper bed depth.

It is slowed down still more on the discharge end section to pass marginal size coal.

Each section of the "Tri-Slope" deck is designed for rapid stratification of the bed, resulting in high capacity. Moist, clogging particles are dislodged by the *Sta-Kleen* feature, consisting of bouncing rubber balls between the screen cloth and a ball retaining deck. The A-C representative in your area will gladly give you more details. Call him, or write Allis-Chalmers, Milwaukee 1, Wis.

Ripl-Flo and Sta-Kleen are Allis-Chalmers trademarks.

ALLIS-CHALMERS

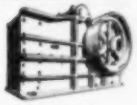
A-C ALLIS-CHALMERS

A-3854

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Hammermills

Vibrating Screens


Jaw Crushers

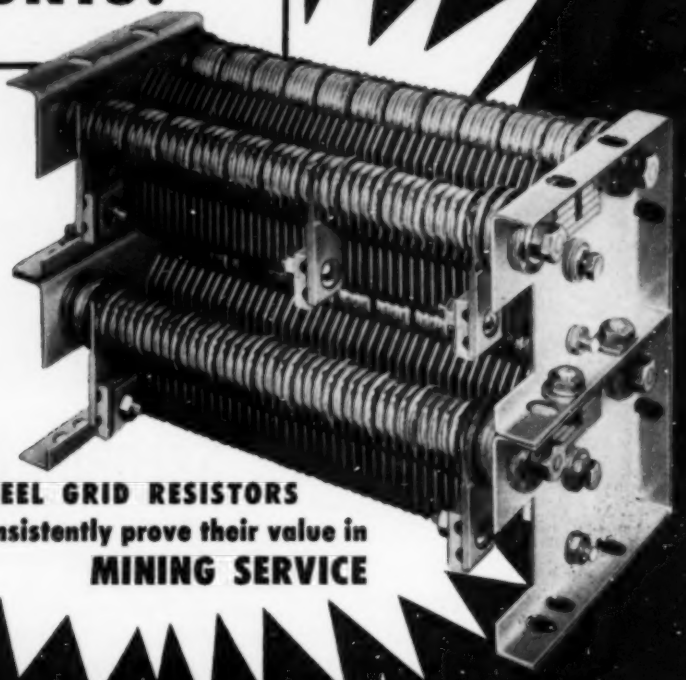
Gyratory Crushers

Grinding Mills

Kilns, Coolers, Dryers

IT'S THE *Built-in Quality* THAT COUNTS!

Designed to fit your present resistor space



STEEL GRID RESISTORS
consistently prove their value in
MINING SERVICE

Steel Grid Resistors for COAL MINES Since 1915

By use of those durable raw materials . . . steel and mica, and the P-G exclusive features of design, these Steel Grid Resistors have the "built-in quality" to overcome factors which often cause resistor failures. Vibration, moisture laden or corrosive atmospheres have little effect on continuity of service. Try Post-Glover Resistors for heavy duty applications where resistors are subject to severe service . . . continuous "Trouble-Free" performance is assured.

The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

• ESTABLISHED 1892 •

221 WEST THIRD STREET, CINCINNATI 2, OHIO

The CONTINUOUS MINER

Gives You Advantages that Protect and Increase Your PROFIT MARGIN

- ★ Maximum Total Recovery
- ★ Favorable Size Consist
- ★ Stay-on-the-Job Toughness
- ★ Rock-bottom Cost per Ton

The benefit that Joy Miners can bring you is not fancy, but fact—*proved in the field* by scores of JCM units working in every producing area and under all conditions from thin to full-seam mining.

Joy Continuous Miners are fast, tough and flexible. They're built to stand up . . . and to do every job you ask of them—from the original development work to taking pillar—at the absolute minimum cost per ton. Total recovery of 80% or better is common, and in some cases exceeds 90%. Why not look into it? Our engineers are at your command, any time! ● ***Joy Manufacturing Company, Oliver Bldg., Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

WBD CL 4393

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

With Armco Liner Plates, safety goes up while costs come down. And you can get these double advantages for portals, overcasts, shafts, haulways and other mining structures.

Safety is vital to men and equipment. Used in these underground structures, Armco Liner Plates provide ample strength without bulky weight. The deep, continuous corrugations continue through the lapped joints to eliminate weak spots. Fire-resistance is another safety feature.

Costs take a beating because Armco Liner Plates are so easy to install. From start to finish, any labor crew can handle the job. In most cases, one man can carry, hold and bolt one of these plates into place, using only a structural wrench. Installation goes fast.

Wide range of Liner Plate gages and structure sizes let you select exactly what you need. Try safe, economical Armco Liner Plates as a solution to your next mine structure problem. Just write for details. Armco Drainage & Metal Products, Inc., 2553 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO LINER PLATES

ARMCO

MEETINGS

Indiana Coal Mining Institute: Fall Meeting, Oct. 17, American Legion Headquarters, Vincennes, Ind.

Coal Exporters' Association of the United States, Inc.: Annual Convention, Oct. 19, Shoreham Hotel, Washington, D. C.

National Coal Association: 1953 Convention, Oct. 19-21, Shoreham Hotel, Washington, D. C.

National Safety Council: Annual Convention and Exposition, Oct. 19-23, Conrad Hilton Hotel, Chicago, Ill.

AIME - ASME: 16th Annual Joint Fuels Conference, Oct. 29-30, Conrad Hilton Hotel, Chicago, Ill.

West Virginia Coal Mining Institute and Central Appalachian Section, AIME: Joint Meeting, Nov. 6-7, Greenbrier Hotel, White Sulphur Springs, W. Va.

Illinois Mining Institute: 61st Annual Meeting, Nov. 6, Hotel Abraham Lincoln, Springfield, Ill.

Kentucky Mining Institute: Annual Meeting, Nov. 12-13, Phoenix Hotel, Lexington, Ky.

PERSONALS . . . From p 142

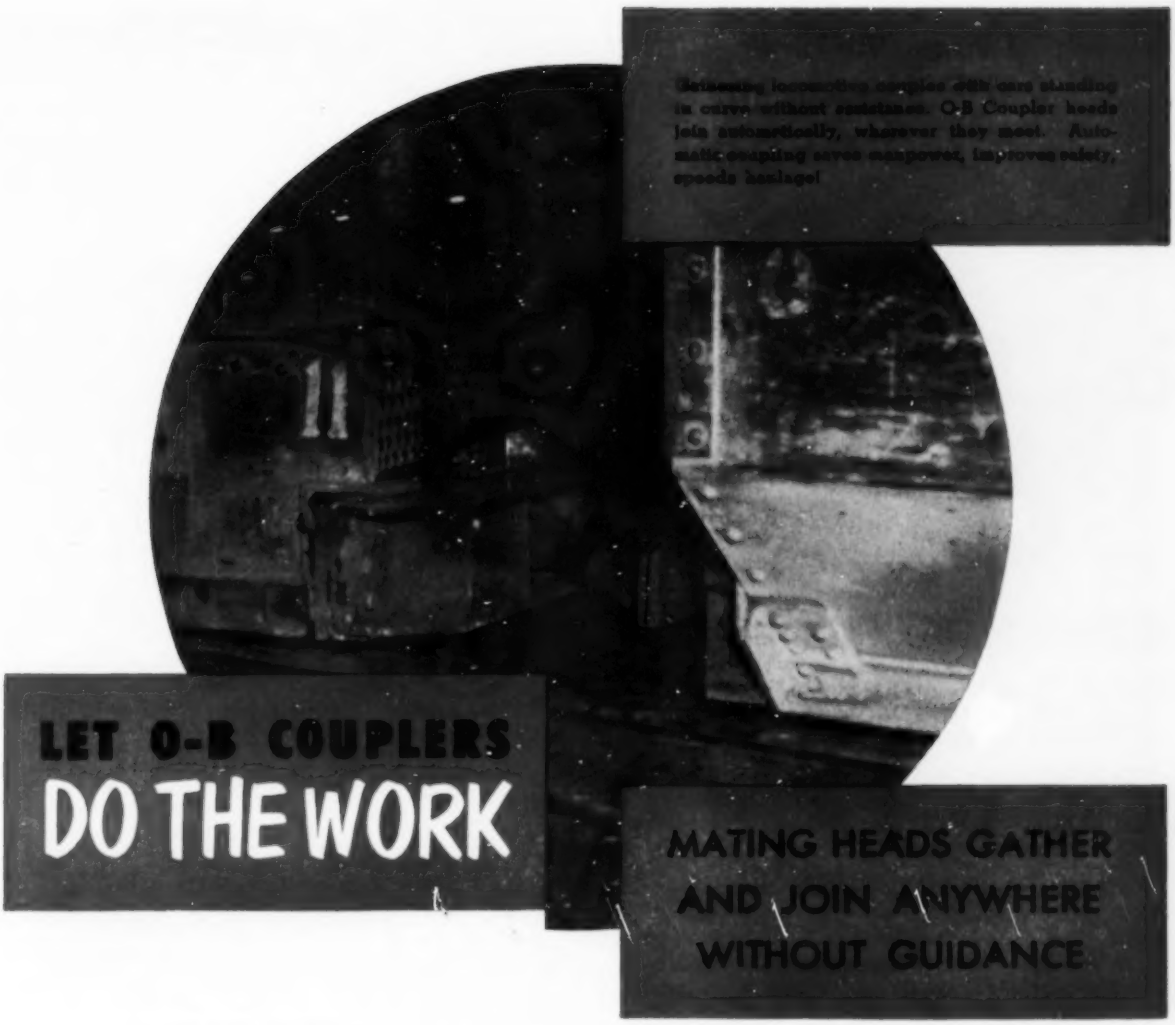
ing and crop-drier projects, is a graduate engineer of the University of Michigan, and prior to joining BCR, was principal chemical engineer at Battelle. Mr. Updegraff, a mechanical engineer, was preparation engineer for Roberts & Schaefer Co. before joining BCR.

Lawrence Jones, formerly general mine inspector, Ebensburg Coal Co., Colver, Pa., has been appointed a Pennsylvania mine inspector. Mr. Jones is expected to be assigned to the 10th Bituminous District, succeeding **C. E. Fisher** who has been transferred to the Pittsburgh area.

John D. Kelly, superintendent, Mine No. 14, Peabody Coal Co., Du Quoin, Ill., resigned last month to join the Freeman Coal Mining Corp., as assistant to the superintendent of the Crown mine, Farmersville, Ill. With Peabody for over 25 yr, Mr. Kelly was superintendent of the company's former Mine No. 59 before transferring to No. 14 in 1951.

A. C. Richardson, who has supervised research in mineral processing at Battelle Memorial Institute, Columbus, Ohio, for the past 20 yr, has been named technical director. Mr. Richardson is widely known in the mining and metallurgical industries for his research in minerals beneficiation, coal preparation and extractive metallurgy. Before joining Battelle in 1933, he was with the Pacific Coke & Coal Co., the Colorado Fuel & Iron Corp. and the USBM.

Elmer R. Kaiser, assistant director of research for Bituminous Coal Research, Inc., in charge of the Columbus, Ohio, office, has been named associate director of the research agency.


Getting locomotive coupler and car standing in curve without assistance. O-B Coupler heads join automatically, wherever they meet. Automatic coupling saves manpower, improves safety, speeds haulage!
LET O-B COUPLERS
DO THE WORK
MATING HEADS GATHER AND JOIN ANYWHERE WITHOUT GUIDANCE

"Join Anywhere" ability in O-B Automatic Mine Car Couplers gives any haulage operation increased safety and speed. Cars equipped with O-B couplers join and automatically couple under any normal haulage condition. Extra-wide gathering range of these couplers permits mating heads to guide one another together wherever cars meet - in curves, dips, or knuckles.

Horizontal gathering range for O-B couplers is 15 inches, or 7½ inches to either side of the coupler centerline. In dips or knuckles, cars may be displaced as much as 14 degrees (and this can be increased to 22 degrees). Even at these extremes O-B couplers meet and join readily.

Increased safety results from O-B coupling, for there's no need for a man to enter the between-cars danger zone. Speed comes with O-B coupling, too. Cars join when they meet, saving the time it would otherwise take to make a coupling by hand.

Couplers with "Join Anywhere" ability keep workmen out of a danger spot; speed haulage movement. Those are pretty good reasons for choosing O-B for your new or remodeled cars!

Ohio Brass

MANSFIELD OHIO, U. S. A.

4354-AM

STOP *Pumping Troubles*
CUT *Maintenance Costs*
AVOID *Costly Shut-downs*

GORMAN-RUPP PUMPS SAVE MONEY

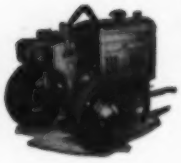
Pumping troubles are greatly reduced and 40% of costs saved with the increased efficiency of the GORMAN-RUPP design. 3 H.P. does what formerly required 5 H.P.

Maintenance problems are minimized due to the extreme simplicity of design — the impeller is the only moving part. Any wearing parts are quickly and easily replaced with common tools. Pumps are furnished bronze fitted, and of all-bronze construction.

Costly shutdowns are practically eliminated. Gorman-Rupp pumps run indefinitely, with little or no attention. Automatically self-priming — ideal for remote location and control, these pumps require very low headroom, are efficient, reliable, and maintain nearly normal capacity under any working head.

All GORMAN-RUPP pumps are **guaranteed** in plain language.

Write for Bulletin No. O-ME-11



FOR STRIP MINE WATER HANDLING

GORMAN-RUPP centrifugal pumps will handle the toughest jobs, no matter how large a volume of water. They will **prime faster, higher and pump more dirty water** than any other pump of comparable size. Self-priming centrifugal pumps range in capacity from 1½-inch, 5,500 G.P.H., to the powerful 10-inch, pumping 240,000 G.P.H.

WRITE US ABOUT YOUR PUMPING PROBLEMS

DISTRIBUTORS

Auto Machine Company, Marion, Illinois
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Superior Sterling Co., Bluefield, W. Va.
Tennessee Mill & Mine Supply Co., Knoxville, Tenn.
West Virginia Pump & Supply Co., Huntington, W. Va.
Weinman Pump & Supply Co., Pittsburgh, Pa.

THE GORMAN-RUPP COMPANY
305 BOWMAN STREET, MANSFIELD, OHIO

Obituaries

Lynn Trovillion, 45, superintendent, Taylorville Div., Peabody Coal Co., Taylorville, Ill., died suddenly Sept. 4 at the company's Mine No. 14, Du Quoin, Ill. With the company since 1928, Mr. Trovillion worked his way up from a clerical capacity to the position of division superintendent, to which he was appointed in 1950.

E. L. Bailey, 63, mining engineer, and vice president of the Charleston Coal Co., Charleston, W. Va., died Sept. 10 in McMillan Hospital there after an extended illness. Mr. Bailey was active in the Democratic party in West Virginia, and served as Democratic state chairman in the 1948 and 1950 campaigns. For several periods he was state road commissioner and also served as chief of the Department of Mines. At one time, he was general superintendent of the Davis Coal & Coke Co., and held similar posts with other operating companies.

Alexander Jack, 62, who retired in 1949 as vice president, Pennsylvania Coal & Coke Corp., died Sept. 13 at Brookville Hospital, Brookville, Pa. A veteran of 45 yr in the coal industry, Mr. Jack, prior to becoming vice president, served 14 yr as general manager with Pennsylvania Coal & Coke, with the exception of 1 yr when he was federal senior coal mine inspector in Birmingham, Ala. He also served as inspector with the Pennsylvania Department of Mines for 8 yr.

NCA Plans Full Program For 36th Convention

A comprehensive report of the organization's activities and the industry's progress and problems will feature the 36th Anniversary Convention of the National Coal Association to be held Oct. 19-21 at the Shoreham Hotel, Washington, D. C., according to the program released last month by Edwin H. Davis, chairman, New York Coal Co., and chairman of the 1953 NCA convention committee.

Among the speakers at the opening general session Tuesday morning will be Douglas McKay, Secretary of the Interior, who will discuss the "Interior's Interest in Coal." Guest speaker at the banquet that evening will be Sen. Everett M. Dirksen, of Illinois. Arthur H. Motley, president, Parade Publications, Inc., and a widely known sales executive, will address the Wednesday luncheon on "Better Selling for Better Living."

The NCA board of directors and committee meetings will be held Monday, Oct. 19, and the annual meeting and luncheon of the Coal Exporters' Association of the United States, Inc., will begin at 1:30 that afternoon. The first general session Tuesday will be opened by L. C. Campbell, vice president, Coal Div., Eastern Gas & Fuel Associates, and NCA president, who will discuss "An Economic Pattern for Coal." Other speakers at the 2-day meeting will discuss such topic as natural-gas competition, public relations, industry research and federal legislation.

COOL O-B Fused Taps give BEST Protection

Here are some reasons why O-B Fused Taps keep cool!

1. Wide contact jaws clamp wire or cable tightly. Current is transferred over a wide area. Several types of contacts available.
2. Tap terminals maintain a tight grip on fuse. Contact surfaces do not oxidize.
3. Three fastening methods assure firm, tight connections for all trailing cable sizes.

Cut-away view of Form-H Tap

O-B Fused Taps give trailing cables the best protection because they *keep cool!* Overheating, of course, reduces a fuse amperage rating, causes blowouts, and tempts machine operators to overfuse. Thus cool taps are important, for they permit steady fuse protection while carrying specified currents.

Save the production that's lost when fuses blow because of overheating. Keep machines working, with adequate fuse protection, with O-B Fused Taps on your trailing cables. From a choice of six wire contacts, and three terminals for trailing cables, you'll get fused taps that are tailored to your face machinery!

Ohio Brass

MANSFIELD OHIO, U. S. A.

4340-M

"Engine Savers"

TWIN DISC MODEL CF TORQUE CONVERTER

"These Twin Disc Truck-Type Torque Converters are engine savers," says Bill Cross, garage foreman whose job it is to keep 30 Dart rear-dump 30-yard trucks moving millions of tons of overburden now . . . and copper ore later, at the huge open pit mine of the Anaconda Copper Mining Company at Weed Heights, Nevada.

• • •

"When what they save in labor and parts on engines and driving units and brakes on one truck is multiplied by 30, like it is here, you've got a friend you don't want to part with," adds Cross.

Twin Disc Truck-Type Torque Converters save not only engines, but brakes, axles, transmissions, clutches — they keep engines operating in their most efficient range; start heavy loads smoothly; provide firmer traction; reduce shifting and pedal braking; prevent fatigue . . . promote operator efficiency.

Twin Disc Truck-Type Torque Converters are available for all heavy duty diesel truck engines, in two distinct types—Model CF for short, steep up-and-down runs, and Model DF with lock-out feature providing direct mechanical drive for long hauls with intermittent grades.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

EQUIPMENT APPROVALS

Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in August, as follows:

J. H. Fletcher & Co.—Type YB-48-A "Trike" truck; one 3-hp motor, 28 v. DC; Approval 2-949; Aug. 17.

Clarkson Mfg. Co.—Type 28FA loading machine; one 50-hp motor, 220, 415 and 440 v, AC; Approvals 2-950 and 2-950A; Aug. 26.

Jeffrey Mfg. Co.—Electric drive unit for 3-ft Aerodyne Junior fan; one 7½-hp motor, 230 v, DC; Approval 2-951; Aug. 27.

Joy Mfg. Co.—Type T2B5APH-1 mining-machine truck; two 4-hp motors, 440 v, AC; Approval 2-952A; Aug. 28.

AIME-ASME Meet to Cover Major Fuel Developments

Major developments in the fuels field and a comprehensive summary of the Midwest oil, gas and solid-fuels situation will highlight the 16th Annual AIME-ASME Joint Fuels Conference to be held Oct. 29-30 at the Conrad Hilton Hotel, Chicago.

The banquet Thursday evening will feature a talk by H. W. Johnson, vice president, Inland Steel Co., and the presentation of the Percy Nicholls Award for 1953 to Henry F. Hebley, Pittsburgh Consolidation Coal Co. Speakers and topics at other sessions include:

Thursday Morning—"Occurrence and Determination of Germanium in Coal Ash," R. C. Corey, J. W. Myers, W. A. Selvig and L. B. Berger, USBM; "Economical Reduction of Moisture Content of Washed Coal," E. Silverblatt and C. A. Dahlstrom, Northwestern University; Session Chairman, R. E. Zimmerman, U. S. Steel Corp.

Thursday Lunch—"Coal and World Affairs," Tom Pickett, executive vice president, National Coal Association.

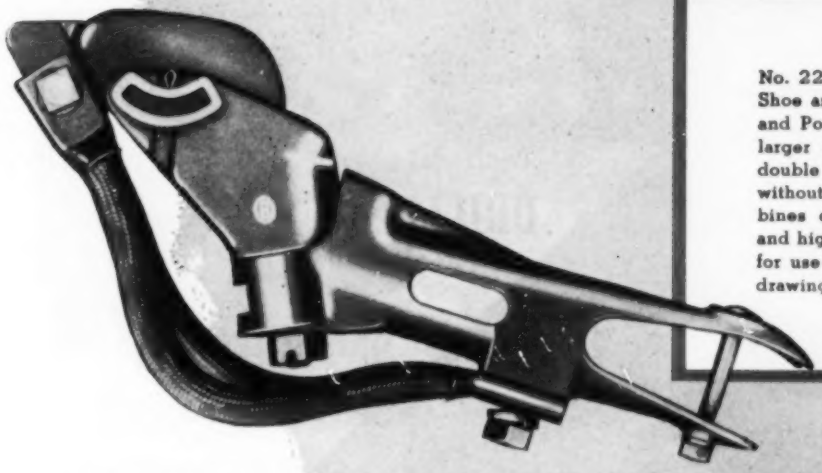
Thursday Afternoon—"New Developments in the Heat Drying of Coal," W. W. Coffin, manager, Dryer Div., Link-Belt Co.; "Frontiers in Heat Extraction from the Combustion Gases," E. R. Kaiser, Bituminous Coal Research, Inc.; Session Chairman, C. H. Sawyer, Eastern Gas & Fuel Associates.

Friday Morning—"Midwest Solid Fuels Situation," W. H. Voskuil, mineral economist, State Geological Survey; "National Gas Supply for Chicago and the Midwest, K. B. Nagler," vice president, Peoples Gas Light & Coke Co.; Session Chairman, W. S. Major, Dravo Corp.

Friday Lunch—"Research in Fuels for Internal-Combustion Engines," R. E. Wilson, chairman, Standard Oil Co. of Indiana.

Friday Afternoon—"Coal Mining Developments," J. D. A. Morrow, president, Joy Mfg. Co.; "Coal Preparation Developments," R. E Sloan and W. McCulloch, Roberts & Schaefer Co.; Session Chairman, R. B. Engdahl, Battelle Memorial Institute.

No. 19399. O-B Type-L Mine Trolley Shoe and Harp, with Shunt and Pole Head. Type-L and Type-M Shoes are interchangeable in the harp casting. As haulage trips become heavier, the longer, double-shunt Type-M Shoe is easily placed in the harp, in place of the Type-L Shoe. However, Type-L Shoes are recommended for use in most modern high-speed haulage systems.



No. 22132. O-B Type-M Trolley Shoe and Harp, with Double Shunt and Pole Head. Type-M Shoe has larger area for wire contact; uses double shunt to carry higher currents without overheating. This shoe combines dependable collector action and higher current carrying capacity, for use on the bigger locomotives drawing in excess of 2000 amperes.

PICK AN O-B TROLLEY SHOE TO Fit Your Haulage Load

Two O-B Trolley Shoes give you a choice in current collector selection:
Type-L Trolley Shoes, recommended for most high-speed mine haulage, when current is less than 2000 amperes.
Type-M Trolley Shoes, recommended for the heavier high-speed haulage work, when locomotive current is well in excess of 2000 amperes.

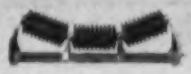
O-B Shoes skim along the trolley wire —hug tight to it—without arcing or wire-burning. They have curved bearings, and pivot in their harps to maintain constant wire contact.

For smooth, trouble-free current collection at today's higher speeds—for today's heavier loads—fit your locomotives with O-B Trolley Shoes.

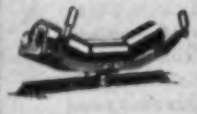
Ohio Brass
MANSFIELD OHIO, U. S. A.

4980-M

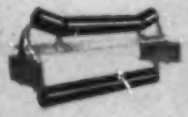
STANDARD DUTY IDLER



RUBBER DISC IMPACT IDLER



SELF-ALIGNING TROUGHING IDLER



PICKING TABLE IDLER

Continental EQUIPMENT FOR THE Mining Industry

Continental manufactures a wide variety of conveyors and mining equipment, engineered and constructed to meet the rugged requirements of the mining industry.

Continental's New
DRILLRAM

- Minimum Investment
- Minimum Maintenance
- Cuts drilling time
- One man operation
- Self Propelled
- AC or DC

- TIPPLE CONVEYORS
- SLOPE CONVEYORS
- UNDERGROUND CONVEYORS

Sectional Type Belt
Chain Conveyors
(Face and Room Type)

- CAR SPOTTING HOISTS

BIRMINGHAM PLANT

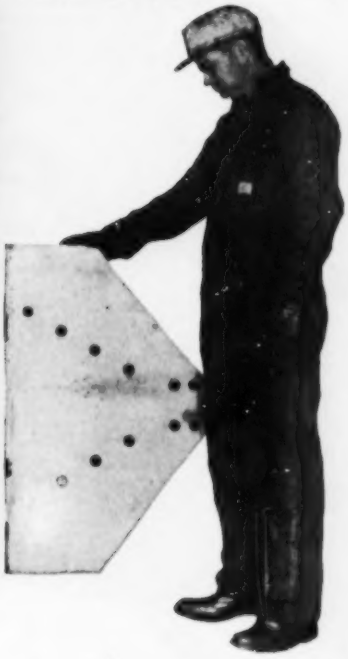
CG-9010

Write for Belt Conveyor Data Book ID-481-A.

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

THE SCREENS in this centrifugal dryer are Stainless Steel. The top row, subjected to the most wear, is replaced after 3000 tons. The middle row lasts 6000 tons and the bottom row 9000 tons. The ½" round hole screens were manufactured by Hendrick Manufacturing Co., Carbondale, Pa.



PREPARATION ENGINEER George Kennedy examines one of eight Stainless Steel blades on an impeller fan. The blades draw 50,000 cubic feet of air per minute through the drying system at a temperature of 100°F.

Stainless Steel dryer screens mean less blinding and longer equipment life at Rochester-Pittsburgh Coal Company

DURABLE, corrosion-resistant Stainless Steel plays a variety of roles in drying equipment at the Waterman preparation plant of the Rochester-Pittsburgh Coal Company, Indiana, Pa. But in every application it contributes to long, trouble-free equipment life.

On the Vissac dryer, blinding has been minimized by use of Stainless Steel wedge bar screens. Eight screens, 39" x 59" with 1 mm. slots, are used with operating temperatures of 900°F. inlet and 100° outlet.

Impeller fan blades which draw hot gases from the furnace to dry the coal are Stainless, too. Pulling 50,000 cubic feet of air a minute through the system at 100°F., the eight blades in the fan are replaced at intervals of about six months—far longer service life than if they were made of other materials.

Twenty-seven ½" round hole Stainless Steel screens are used in a centrifugal dryer at the plant. Coal enters this dryer with about 30% moisture and leaves with about 7%. The screens are in three rows of nine screens each with the top row, at the feed end, receiving the most wear. Top row screens are replaced after 3000 tons, the second row after 6000 tons, and the bottom row after 9000 tons.

Stainless Steel's resistance to corrosion and wear, its freedom from blinding and its ability to maintain hole size make it the best screen material you can obtain. Take steps now to cut operating costs in your preparation plant by specifying Stainless for screen and for other equipment where corrosion and abrasion take their toll. And for finest performance, ask your fabricator to use U·S·S Stainless Steel. Write for our booklets, "U·S·S Stainless Steel Screens" and "The Sunnyhill Story," which show the many ways Stainless Steel can cut costs in preparation plants. United States Steel Corporation, Room 2817-Y, 525 William Penn Place, Pittsburgh 30, Pa.

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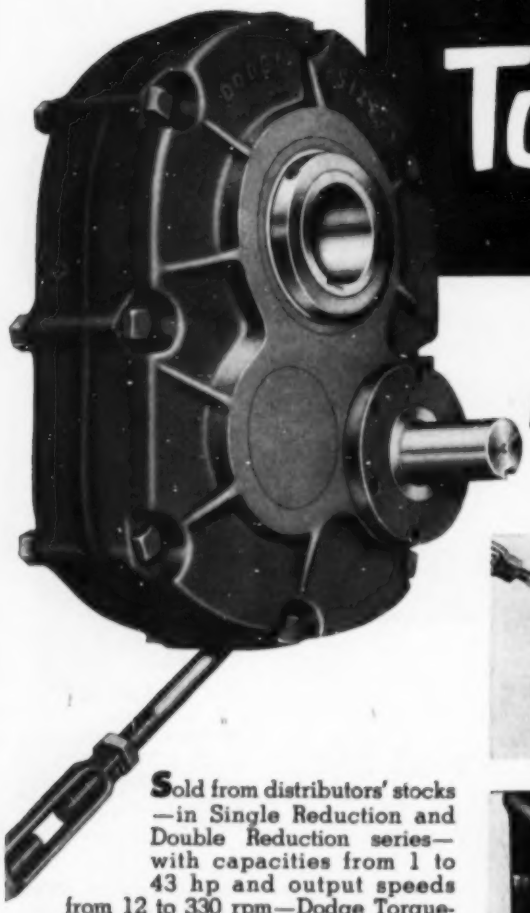
3-648

UNITED STATES STEEL

Torque-Arm



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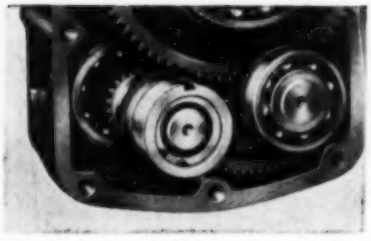
Provides instant, positive protection for driven machines, motors and reducer itself. Automatically (1) loosens the belts, (2) cuts off power, (3) gives a warning.



TORQUE-ARM BACK STOP
Available from stock when required. Easily installed—sealed inside reducer housing. Simple, positive action prevents reversal.

Sold from distributors' stocks—in Single Reduction and Double Reduction series—with capacities from 1 to 43 hp and output speeds from 12 to 330 rpm—Dodge Torque-Arm is the new and modern idea in speed reducers.

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Unit is driven through any V-Belt Drive. Torque-Arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.

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DODGE
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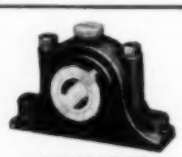
CALL *THE TRANSMISSIONEER*, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone book.

TAPER-LOCK SHEAVES, SEALED LIFE V-BELTS


DODGE-TIMKEN PILLOW BLOCKS

TAPER-LOCK FLEXIBLE COUPLINGS

(See! No Picture!)

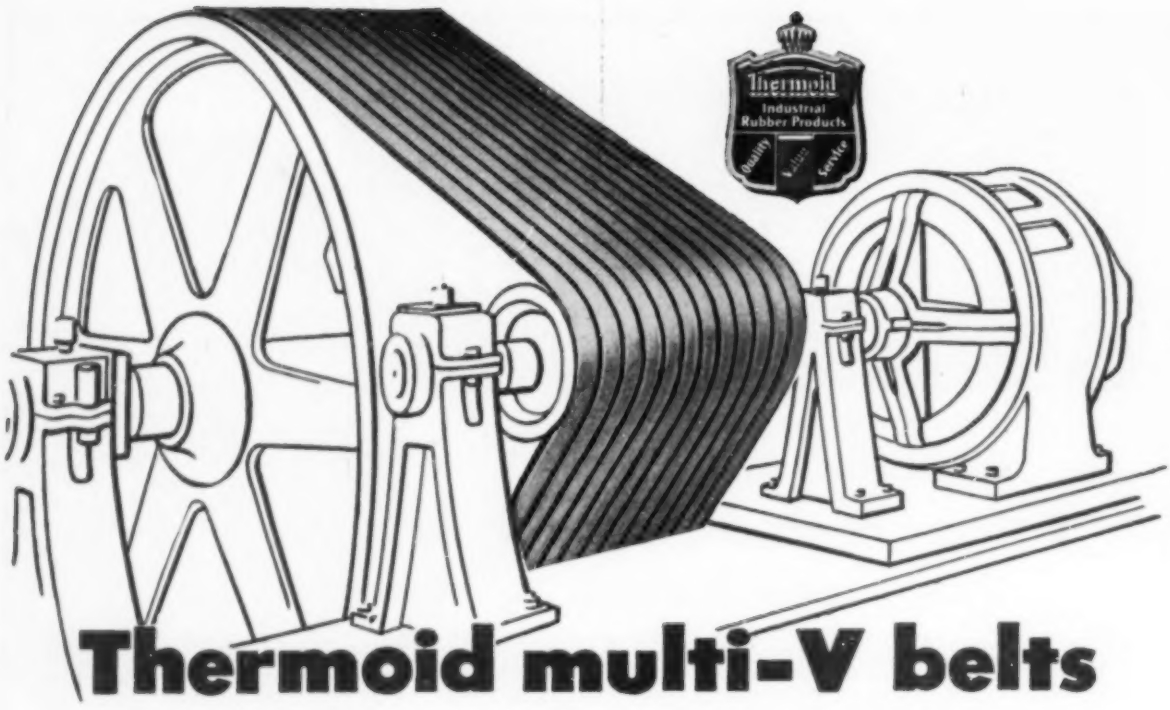
We thought we'd catch your eye and give it a break at the same time!

Most of you mining and quarry men undoubtedly follow, as we do, all of the top magazines in the field. You have to, in your business. We have to, in ours. And if you're anything like us you've probably gotten tired of seeing the same sort of pictures, page after page.

SO WE THOUGHT WE'D CATCH YOUR EYE, AND GIVE IT A BREAK AT THE SAME TIME by not showing any picture at all! As for selling you, we feel we can rely on the acceptance and popularity the great Cities Service name enjoys throughout the industry. ACCEPTANCE because our industrial oils and greases are as good as the best in every case, better in most! POPULAR because Cities Service Engineers have gone out of their way, time and time again, to help solve tough lubricating problems successfully in hundreds of mining and quarry operations.

If you have a tough problem on your hands, call in our Lubrication Engineer for help . . . and take advantage of the tremendous research staff and laboratory facilities that back up every Cities Service Lubrication Engineer. Simply call or write your nearest Cities Service Office, or write Cities Service Oil Co., Dept. J-5, Sixty Wall Tower, New York 5, New York.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS



Thermoid multi-V belts

pre-stretched for non-slip performance

When you use Thermoid *Pre-stretched* Multi-V Belts, you can be sure of maximum power transmission, economical non-slip performance and extra long belt life.

Thermoid Multi-V Belts withstand moisture, abrasion and repeated shock loads.

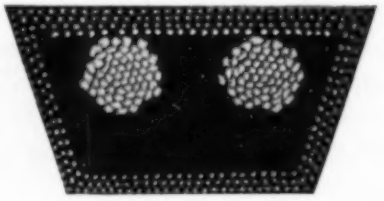
They're built to take it—specially designed to resist internal friction and heat.

Your Thermoid Distributor can help you with power transmission problems, whether you use Multi-V, F.H.P. or Flat Transmission Belts.

It pays to specify Thermoid.

Thermoid D and E Sections
Grommet type construction assures lower permanent stretch, greater flexing ability and shock absorption.

Thermoid A, B and C Sections
Plied cord construction, latex impregnated to reduce internal friction and heat build up.



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F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

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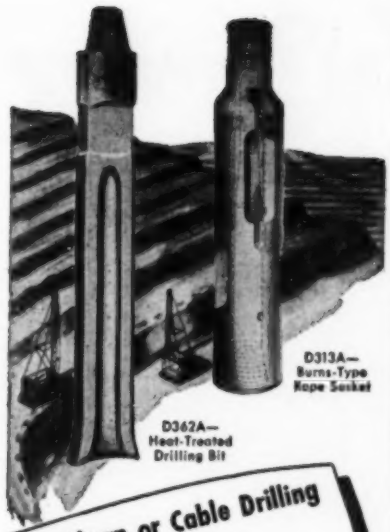
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah



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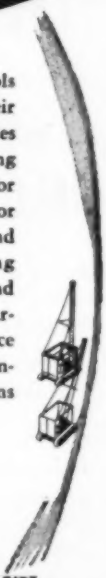
Spang Churn or Cable Tools are top performers in their fields for drilling test holes when prospecting or sampling . . . drilling blast holes for fragmentation of minerals or overburden . . . drilling and reaming escape, dewatering and ventilating holes . . . and drilling wells for other purposes. Fifty years' experience serving oil, water-well, mining and quarrying operations assures their value.



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for pilot hole drilling and stage enlargement reaming of dewatering, ventilation and escape holes.

D370F—Prefabricated
Star Bit

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made by
SPANG & CO., BUTLER, PA.
for
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• PROSPECT DRILLING • SAMPLING

COAL MEN ON THE JOB . . .

Itmann Colliery, Pocahontas Fuel Co., Inc., Itmann, W. Va.

For a Description of the Itmann Plant and Colliery, See P 88.

H. A. CASSELL (left), superintendent, Itmann colliery; W. H. Bowen, safety engineer, and J. W. Forman, preparation engineer, both serving all mines, with headquarters at Pocahontas, Va.; H. C. Hendrick, coal inspector, and Guy Haynes, tipple foreman, Itmann.

DAY SHIFT, Itmann colliery, all section foremen except as noted: Seated—F. R. Shutt (left), H. Ellenburg, M. M. O'Brien, assistant mine foreman, C. B. Taylor, P. H. Harris and T. L. Bailey, assistant night foreman. Standing—C. R. Hall (left), E. W. Bowling, mainline foreman, J. G. Wilburn, dispatcher, H. M. Runion, T. J. Baugh, assistant superintendent, G. L. Asbury, assistant general mine foreman, J. R. Goodloe and R. H. Edwards, electrician.

NIGHT SHIFT, Itmann colliery, all section foremen except as noted. Seated—H. H. Morefield (left), general mine foreman, Lindsey Ferguson, H. E. Barton, Robert Jackson and Vaught Hawks. Standing—Shelby Tolliver (left), general night foreman, Frank Cunningham, dispatcher, J. C. McCoy, A. B. Cook, C. H. Martin and A. J. Dempsey.

More "Coal Men" Photos on Pp 170, 194, 196 and 200.

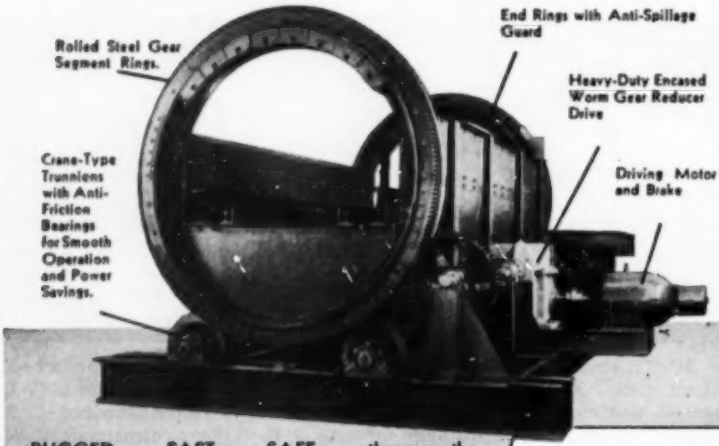
Here's the answer—

TO LOW-COST OPERATION

CONNELLSVILLE (LEPLEY) ROTARY MINE CAR DUMPS

RUGGED FAST SAFE

WITH THESE BUILT-IN FEATURES . . .


Rolled Steel Gear Segment Rings.
End Rings with Anti-Spillage Guard
Heavy-Duty Encased Worm Gear Reducer Drive
Crane-Type Trunnions with Anti-Friction Bearings for Smooth Operation and Power Savings.
Driving Motor and Brake

RUGGED . . . FAST . . . SAFE . . . these are the qualities built into CONNELLSVILLE (Lepley) Rotary Mine Car Dumps that have enabled them to give the most economical service over long periods of time. CONNELLSVILLE (Lepley) Dumps installed in 1927 and 1929 are still in operation and meeting the demands of modern mechanized coal handling. CONNELLSVILLE (Lepley) Rotary Mine Car Dumps are designed with simplicity and certainty of operation prevailing, with the object of keeping maintenance and repair costs at a minimum. By either lever or pushbutton, one man controls the entire dumping operation . . . Cars are automatically power-locked in position and held secure while discharging . . . Coupled or uncoupled cars are dumped in a 10 second operation . . . Positive gear drive on each end prevents twisting of car in frame.

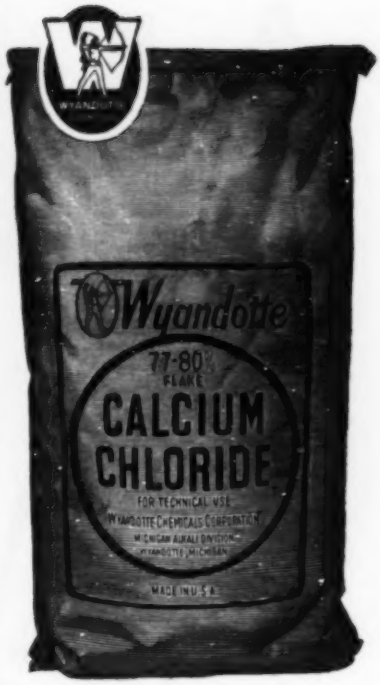
The proved quality of CONNELLSVILLE (Lepley) Rotary Mine Car Dumps is your assurance of long-term, low-cost operation.

EXCLUSIVE!

EXCLUSIVE with CONNELLSVILLE (Lepley) Rotary Mine Car Dumps are the machine - cut gear rings that mesh with the machine-cut pinions resulting in drive from both ends without play and slippage.

We also manufacture CAGES, HOISTS, HAULAGES, MINE FANS, SKIPS, COAL AND SLATE LARRIES, ROTARY ROCK DUMP CARS, LEPLEY HOISTING EQUIPMENT, YOUGH PUMPS, FORT PITT CAR-CAGING EQUIPMENT.

CONNELLSVILLE
MANUFACTURING & MINE SUPPLY CO.
CONNELLSVILLE, PA.
SERVING THE MINING INDUSTRY SINCE 1901



FREEZEPROOF COAL

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CALCIUM CHLORIDE

Prevents mining coal twice! Keeps coal unfrozen in transit and stockpiles. Satisfies dealers. Also dustproofs.

Wyandotte Calcium Chloride works for you the year around:

- De-ices
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Wyandotte CHEMICALS

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN

Jensie Mine Plant

—OHIO DUPLICATE OF WARNER'S HIGHLY SUCCESSFUL R&S-ENGINEERED PREPARATION PLANT AT MAMMOTH, WEST VIRGINIA

The new Jensie Plant at Bergholz, Ohio—a duplicate of the Warner Collieries Company's Mammoth Washery at Mammoth, West Virginia—is engineered to give maximum production of premium washed coal in prepared sizes.

Raw coal from the famous Ohio No. 5 seam is crushed to 5″ x 0″. The 3/8″ x 0″ is screened out and bypassed for industrial use. The 5″ x 3/8″ is washed in an R&S Hydro Separator and sold as a premium coal.

Both the Jensie Mine Plant and the Mammoth Washery were engineered and constructed by Roberts & Schaefer Co.

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R AND S COMPANY

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work harder . . . work longer . . . work for less!

MORE POWER AT LOWER COST! You can look forward to sizeable savings on gasoline with Chevrolet trucks on the job. In heavy-duty models, the advanced Loadmaster engine with new high-compression ratio of 7.1 to 1 delivers more power than ever—and does it on less fuel! In light- and medium-duty models, Chevrolet's Thriftmaster engine combines top-notch performance, with rock-bottom operating cost.

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LOWEST PRICED LINE! You start saving money the moment you buy a Chevrolet truck. For, in addition to all its other advantages, Chevrolet is *America's lowest priced truck line!* Why not start saving *now!* Your Chevrolet Dealer will be happy to give you all the facts. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

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TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTIPANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

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For Greater Shipping and Loading Convenience ...the improved AMERICAN Container-Cartridge

American Explosives' popular shipping-loading container-cartridge has been modified and improved to afford even greater convenience in coal stripping operations.

1. Strapped in bundles of two, these cartridges are easy to ship, easy to handle, easily loaded directly into each hole.

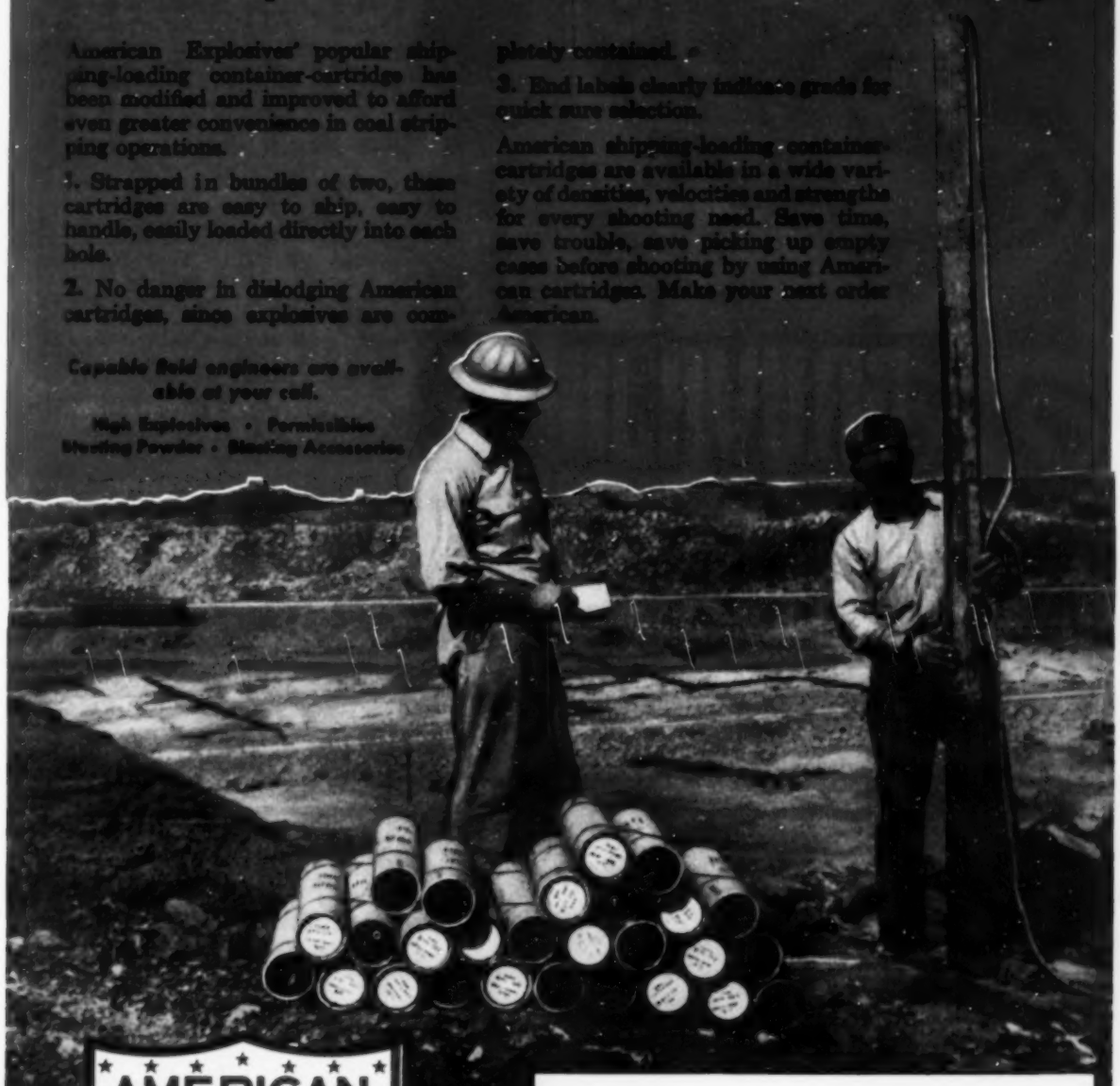
2. No danger in dislodging American cartridges, since explosives are completely contained.

3. End labels clearly indicate grade for quick sure selection.

American shipping-loading container-cartridges are available in a wide variety of densities, velocities and strengths for every shooting need. Save time, save trouble, save picking up empty cases before shooting by using American cartridges. Make your next order American.

Capable field engineers are available at your call.

High Explosives • Permissibles
Blasting Powder • Blasting Accessories



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brand new!

GRUVAJOINT

lightweight couplings for grooved pipe systems

Up to 45% lighter, GRUVAJOINTS offer real freight savings; are easier to work with than ordinary couplings.

GRUVAJOINTS' trim design means quick application even in close working space; easy handling; convenient storage.

New GRUVAJOINTS cost less than conventional grooved pipe couplings.

Hot from the foundry, GRUVAJOINTS fill your need for low cost, lightweight couplings for 2", 3" and 4" grooved pipe lines carrying pressures up to 500 psi. GRUVAJOINTS are simple to apply and remove; automatically allow contraction and expansion, line movement and layout misalignment. They can be used over and over again. Their entire surface is protected with green rust inhibitor.

GRUVAJOINT sealing gaskets are interchangeable with GRUVAGRIPS (standard weight grooved pipe couplings). GRUVAJOINTS couple perfectly with GRUVAGRIP FITTINGS.

You'll see GRUVAJOINTS at your supply stores soon.

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New eight page folder gives you full description — advantages, working principles, application steps, specifications — of GRUVAJOINTS, ROLAGRIPS (couplings for plain end pipe), GRUVAGRIPS and GRUVAGRIP FITTINGS. Write today for folder ACF.

GRUVAJOINTS are designed, made, tested and guaranteed by

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MINERAL PRODUCERS . . . Cont'd

faced with the problem of moving to new areas or going to deep mining. The present Compton auger is the result of just such a problem experienced in northern West Virginia by the Grafton Coal Co., whose owners developed the Compton auger. Mr. Bondurant explained that Grafton became interested in auger mining when the stripping limit was reached. Some early types had been made but none was considered satisfactory because production was only about 7 tph, much slack-size coal was produced and augers were short. These disadvantages had to be overcome, he continued, and a machine had to be developed that would produce coal at low cost.

The first highwall auger built by Compton was rubber mounted and required pits 90 ft wide. Subsequent changes were made untill the Model 56 was developed. This pontoon-mounted unit, 56x20x17 ft, is powered by a 300-hp diesel engine and carries six 34-ft augers, can drill to a depth of 204 ft and can produce 60 to 90 tph. It was offered to the mining industry after neighboring operators saw the unit in operation at the Grafton mine and were impressed with the possibilities of the new machine.

Successful application of the Model 56 led to development of other smaller models to fit narrower pits and thinner coal. Among these was the Model 42, which carries nine 21-ft augers, can drill 189 ft of 48-in hole and produce coal at a rate about 10% slower than the Model 56. Other models, such as the Model 48 and Model 36, were developed for special applications.

In summing up the advantages of highwall auger mining, Mr. Bondurant emphasized that a 4-man crew can produce 500 tpd of high-quality coal; selective mining is possible; coal is usually low in moisture and handles well with less degradation; combined strip and auger operations are profitable where stripping alone would be too costly; and coal can be recovered in isolated areas or where shattered conditions exist.

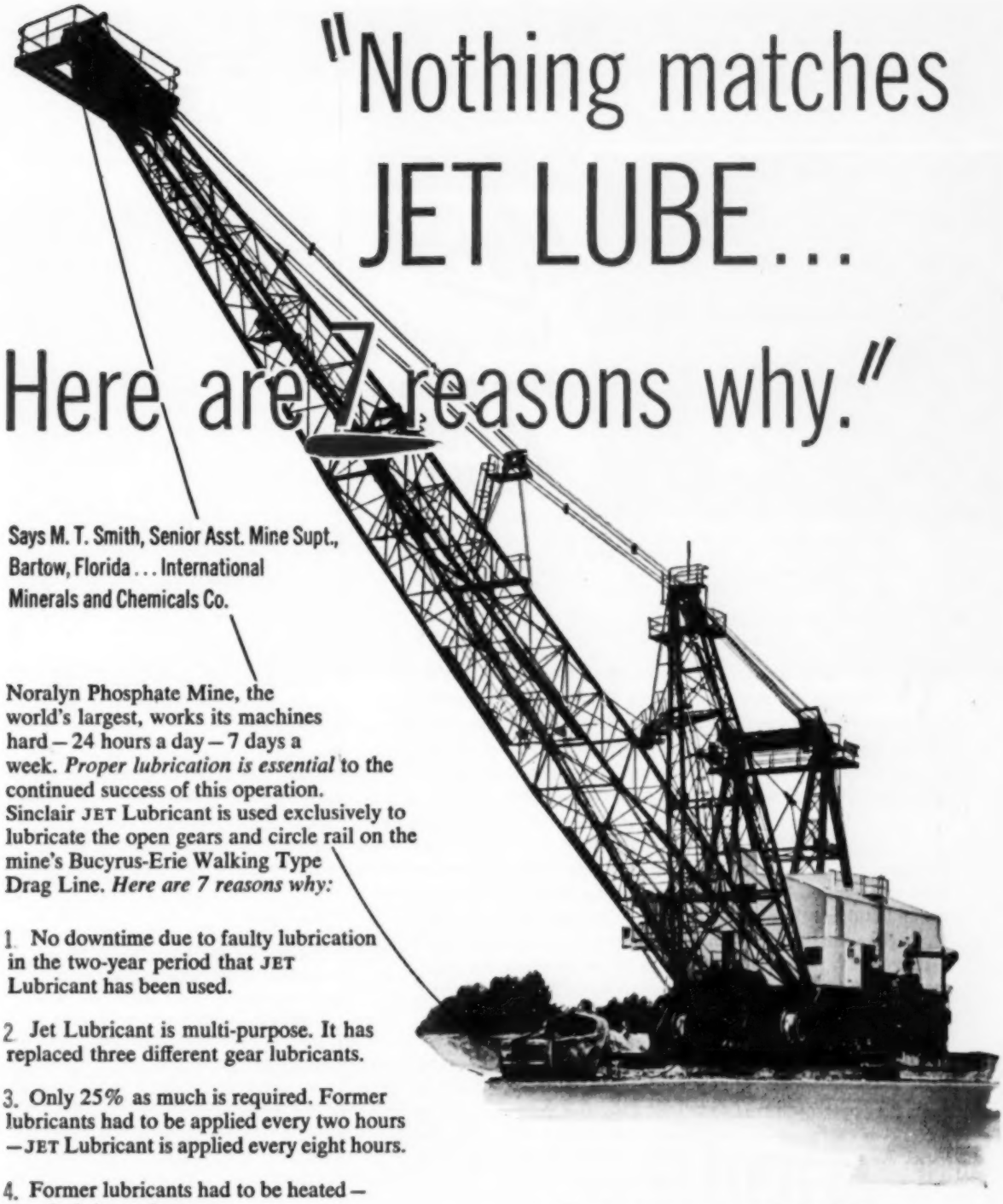
SALES TAX

The Pennsylvania Sales Tax as applied to coal mining was explained by E. D. Odenbaugh. He emphasized that the new law was a tax on property coming to rest in the state and applies to tangible property only. If a product goes directly into a direct production cost, then it is exempt from the tax. Any item that is capitalized also is not taxed, he said. Exemption can be claimed if an item is purchased for the production of a mineral and is consumed in one year and is a necessary business expense, he added.

Pittsburgh Coal Team Tops Pa. Safety Meet

The first-aid team of the Westland mine of the Pittsburgh Coal Co. took top honors in the 11th Annual Pennsylvania State

"Nothing matches JET LUBE... Here are 7 reasons why."



Says M. T. Smith, Senior Asst. Mine Supt., Bartow, Florida... International Minerals and Chemicals Co.

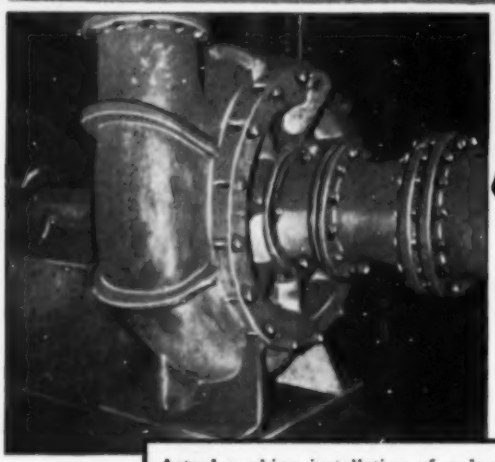
Noralyn Phosphate Mine, the world's largest, works its machines hard—24 hours a day—7 days a week. *Proper lubrication is essential* to the continued success of this operation. Sinclair JET Lubricant is used exclusively to lubricate the open gears and circle rail on the mine's Bucyrus-Erie Walking Type Drag Line. *Here are 7 reasons why:*

1. No downtime due to faulty lubrication in the two-year period that JET Lubricant has been used.
2. Jet Lubricant is multi-purpose. It has replaced three different gear lubricants.
3. Only 25% as much is required. Former lubricants had to be applied every two hours —JET Lubricant is applied every eight hours.
4. Former lubricants had to be heated—JET Lubricant does not.
5. JET Lubricant doesn't harden—former lubricants had to be scraped off during shutdowns.
6. JET Lubricant reduces inventory.
7. JET Lubricant eliminates any chance of misapplication.

● There are *more* reasons why the right grade of JET Lubricant and other Sinclair products can improve your operations. Why not phone or write the nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

Continuous Low-Wear Non-Clog Solids Pumping... At Lower Cost



Morris

low-speed wide-clearance SOLIDS PUMP

Actual working installation of a low-speed, wide-clearance Morris Solids Pump which handles fine solids at a rate of 6,000 gpm at 52′ total head. Pump speed only 370 rpm, 14″ suction opening, 12″ discharge.

Where total heads do not exceed about 120 feet, low-speed, wide-clearance Morris Type-M Solids Pumps will handle solids ranging from fine abrasives up to pieces 11″ in diameter. The low-speed reduces the abrasive action of the smaller particles, the large clearance allows larger solids and "tramp" pieces to pass without trouble.

Longer Wear, Easier Maintenance

Designed so that the most important wearing parts receive the least wear, initial high mechanical and hydraulic efficiencies are maintained throughout the longer service period of the pump. Double-thick wearing parts are sub-divided and protected so that the greatest erosion is taken by easily replaced segments. That means speedy, easy renewal, less down-time and lower maintenance cost.

Free Consultation

Morris engineers are always available to discuss and study your pumping problems with you. Describe your needs in a letter—or call your nearest Morris office. Our recommendations are free—entail no obligation. Write for Bulletin 175 which describes the Type M Solids Pump in detail.

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Sales Offices in Principal Cities

MORRIS *Centrifugal Pumps*

Bituminous First Aid Contest held in Ebensburg, Pa., Sept. 12. Competing against 26 other teams selected through district meets during the summer, the Westland team, captained by Edward Rettinger, won the state-wide championship with a score of 99.552. In addition to the cash award of $350, the team received trophies from the Mine Safety Appliances Co. and the UMWA.

Other ranking teams were: second, Whitney mine, Stewart Coal & Coke Co., captained by Andrew Marcink, 99.551; third, Montour No. 10 mine, Pittsburgh Coal Co., captained by Albert Waggett, 99.550; fourth, Mine No. 31, Jamison Coal & Coke Co., captained by Clair Taylor, 99.501; and fifth, Kyle mine, U. S. Steel Corp., captained by Verner Hoover, 99.500.

The meet was sponsored by the Pennsylvania Department of Mines, in co-operation with coal operators, the UMWA and USBM. Dennis J. Keenan, general superintendent, Sterling Coal Co., served as general chairman for the contest, and speakers during the ceremonies included: I. J. Forbes, director, USBM; William J. Clements, secretary, Pennsylvania Department of Mines; Tom Pickett, executive vice president, National Coal Association; R. T. Laing, executive director, Central Pennsylvania Coal Producers' Association; and John Ghizzoni, president, District 2, UMWA.

Blue Diamond Mines Sweep Kentucky River Safety Day

Teams from the Blue Diamond mine and Leatherwood Nos. 1 and 2 mines of the Blue Diamond Coal Co. placed first, second and third, respectively, in the safety Day competition of the Kentucky River Mining Institute held Sept. 12 at Hazard, Ky. A. D. Sisk, chief of the Kentucky Department of Mines and Minerals, was one of the officials assisting in the presentation of prizes to the winning teams, and guest speaker was Harry Gandy Jr., manager of the Safety Div., National Coal Association.

Pardee & Curtin Team Victor in W. Va. Meet

The Bergoo No. 4 mine team of the Pardee & Curtin Lumber Co. won first prize at the 3rd Annual Safety Day of the Mid-State Coal Mining Institute held at Richwood, W. Va., late in August. The winners had an almost perfect score, chalking up 1,497 out of a possible 1,500 points. Placing second was the No. 2 mine of the Imperial Smokeless Coal Co. and third, a team from the Maust Coal & Coke Co.

Association Activities

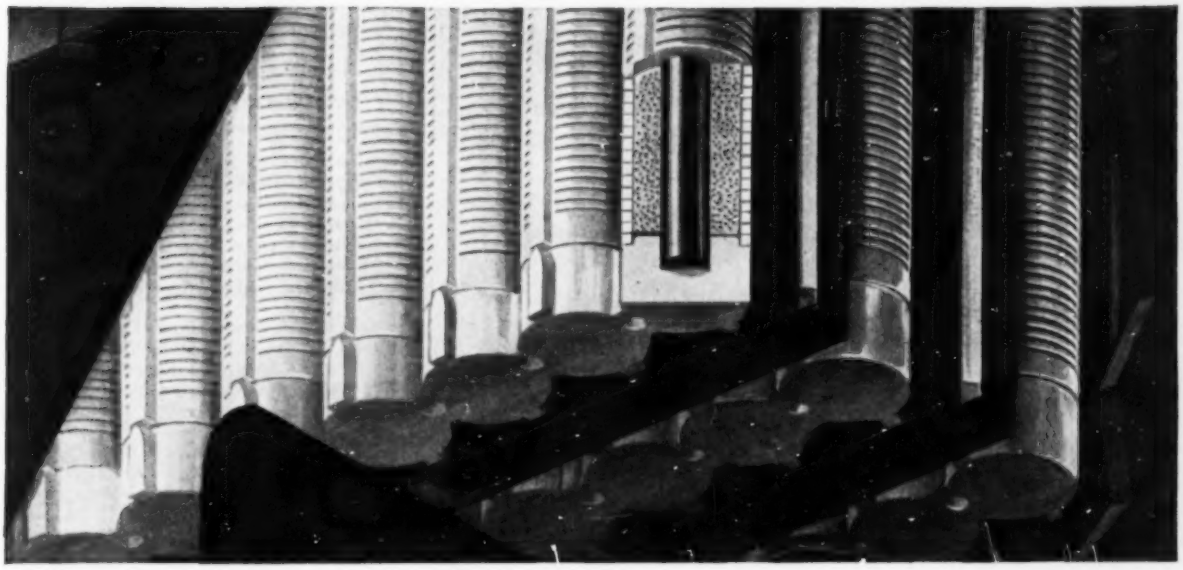
Moshannon Mining Institute Marks 31st Anniversary

Over 800 members and guests attended a dinner and Ladies Night held by the Moshannon Coal Mining Institute in Altoona, Pa., Sept. 17. R. T. Laing, executive director, Central Pennsylvania Coal Producers' Association, acted as master of

For Mine haulage . . . Exide-Ironclad now offers

★ 20% more capacity in the same space

★ Lowest cost per A.H. to own and operate



This cutaway picture shows the inside of the new T H EXIDE-IRONCLAD Battery.

Its larger positive plates, containing corrosion-resistant Silvium, are different . . . unique . . . exclusive! No other type of positive plate construction offers you the advantages of the T H Exide-Ironclad, with its slotted plastic tubes, permanently sealed on the bottom with polyethylene tube sealer. More active material is exposed to the electrolyte, resulting in greater power. More active material is retained, providing higher battery capacity for a longer working life. Other features include improved negative plates . . . practically indestructible Pormax separators . . . new sealing compound . . . shockproof molded jar . . . unbreakable quarter-turn vent plugs of plastic . . . corrosion-resistant tray coating.

All of the features of the new T H Exide-Ironclad Battery construction provide direct operating-hour savings for you.

Now-more than ever before...
YOUR BEST POWER BUY AT ANY PRICE!

1888... DEPENDABLE BATTERIES FOR 65 YEARS...1953

The new T H Exide-Ironclad BATTERY

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2 • *Exide Batteries of Canada, Limited, Toronto*

"EXIDE", "EXIDE-IRONCLAD", "SILVIUM", "PORMAX", *Reg. T.M. U.S. Pat. Off.*

CONVERTED GOODMAN 460 or 360 LOADER
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for Economy...
CONVERT NOW from TRACK to TRACKLESS
"TRACKLESS MINING" with conventional cutters, loaders and shuttle cars provides the most economical and efficient mining system available today.
These trackless advantages are yours by having your track-mounted cutters and loaders converted to trackless operation - Lee-Norse "conversions" that result in greater savings to you through . . .
• Lower investment compared with new mining machines.
• Very little increase in spare parts inventory.
• Converted machines are well-known to your operators and maintenance men - no need for re-education.
• Lost time for conversions minimized.
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Lee-Norse Company
Specialists in Coal Mining Equipment
CHARLEROI, PA.
Write today for complete facts on converting your track mounted equipment.

ceremonies at the dinner, which marked the institute's 31st anniversary. Newly elected officers presented at the meeting were: president, Robert Emigh, DuBois, Pa.; vice presidents, John F. Foreman, Cresson, P. B. Gaddis, Clearfield, and A. J. Nairn, Punxsutawney; and secretary, Robert I. Boyer, Madera. The institute's board of directors includes: A. J. Dukes, Cresson; J. W. George, Robertsdale; R. E. George, Altoona; D. B. Millward, Philipsburg; and Walter S. Williams, Ramey.

Preparation Facilities

Pocahontas Fuel Co., Inc., No. 31 colliery, Amonate, Va.—Shipment by Deister Concentrator Co. of 16 No. 7 SuperDuty Diagonal-Deck coal-washing tables making a total of 24 installed, with three Model 108-B Concenco revolving feed distributors feeding them equally.

Roslyn Cascade Coal Co., Ronald, Washington—Shipment by Deister Concentrator Co. of two SuperDuty Diagonal-Deck coal-washing tables to handle ¼ x 0.

Russell Fork Coal Co., Mikegrady, Ky.—Shipment by Deister Concentrator Co. of four SuperDuty Diagonal-Deck coal-washing tables cleaning minus ⅜ x 0, and one Model 109 Concenco revolving feed distributor with four-way feed distribution.

Ozark Philpott Mine, Ozark, Ark.—Shipment by Deister Concentrator Co. of one No. 7 SuperDuty Diagonal-Deck coal-washing table for cleaning ¼ x 0.

North Branch Coal Corp., Kitzmiller, Md.—Shipment by Deister Concentrator Co. of one Type D 3 x 6-ft double-surface Leahy screen for handling stoker-size coal.

Nugent Mining Co., Luthersburg, Pa.—Contract closed with H. J. Daniels & Co., Inc., for one Daniels DMS dense-media system recovering 20 tph of ¾ x ⅛ coal from feed consisting of rejects from picking table and from present heavy-media unit.

Jacob's Fork Pocahontas Coal Co., Squire, W. Va.—Contract closed with Fairmont Machinery Co. for addition to present plant of two 5 x 14-ft Twin Deck American pneumatic separators, capacity 120 tph of ⅜ x 0.

David Z. Norton Co., No. 3 mine, Powhatan, Ohio.—Contract closed with Nelson L. Davis Co. for one Size No. 140 Neldco heavy-media packaged plant, including a heat drier, crushing and screening facilities, cleaning 5 x ¾ in the Neldco unit and heat drying ¼ x 0 coal, capacity 150 tph.

Tasa Coal Co., No. 8 mine, Zelienople, Pa.—Contract closed with McNally Pittsburg Mfg. Corp. for addition to present preparation equipment of one McNally Norton 2030 coal washer handling 5 x ¾ raw coal at 90 tph.

QUICK INTERCHANGEABILITY

Wilmot Chain Will Replace the Same Size Number of **Any** Other Rivetless Chain

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HAZLETON, PA. -- Wilmot Engineering Co., Markle Bank Bldg.
HONOLULU 6, H. I. -- P. S. Pell & Co., Ltd., 88 S. Queen St.
KNOXVILLE, TENN. -- Crowell Engineering & Sales Co., 3045 Sutherland Ave.
PITTSBURGH 16, PA. -- Harold C. Lusk, 3045 W. Liberty Ave.
PORTLAND 4, ORE. -- Peoria Chain Co., 103 S. W. Front Ave.
ST. LOUIS 5, MO. -- Jack Van Horn, 7543 Cromwell Drive
SALT LAKE CITY, UT. -- Western Sales Engineering Co., 375 S. W. Temple
NEW YORK 38, N. Y. -- International Manufacturing & Equipment Co. (export only), 220 Broadway

As the designers and originators of rivetless chain, Wilmot offers the largest choice of sizes available. Any one of them will interchange with the same number of any other chain. In the Wilmot catalog of rivetless chain conveyors you will also find by far the largest listing of chain attachments. Because of this more complete choice of conveyor parts, an increasing number of leading firms are depending on Wilmot for all replacements.

Wilmot has, or will design, everything for your conveyor. Chain furnished in pitches from 3" to 10½" and in working loads from 3,000 to 130,000 lbs., of drop-forged steel, alloy, or cast chrome-manganese. As the originators, Wilmot has been largely responsible for the many auxiliary parts that today give these conveyors almost limitless applications: sprockets, traction wheels, flights, take-ups, shafting, bearings, casings and trough in cast iron, ductile iron, carbon or chrome-manganese steel. You can economize on spare parts by depending on Wilmot for all replacements.

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950 OAK ST. INDIANA, PA.

Southern Collieries' Team First in Tennessee

WINNER of the Tennessee Mineral Industries First Aid Contest held in Knoxville Aug. 29 was this team representing the PeeWee mine of the Southern Collieries, Inc., and Local 3164, UMWA, which led a field of 13 teams with a score of 99.73. Team members above are: George Andrews (left), captain, W. Shelby Hendron, Charles F. Sharp, Randall L. McCoy, Dewey Duncan, Troy Johnson and Wayne L. Goodman. The contest and safety day, attended by some 1,500 people, was sponsored by the Tennessee Division of Mines, the Southern Appalachian Coal Operators' Association, the UMWA and the USBM.

COAL MEN ON THE JOB . . .

KENTUCKY ASSOCIATION OFFICIALS: William B. Sturgill (left), executive secretary, Hazard Coal Operators' Association, and Robert Dickson, secretary and safety director, Kentucky River Mining Institute, Hazard, Ky.

Ensign-Clark STARTERS
built for
HEAVY-DUTY
MINE SERVICE

Ideal for shaker conveyor drives. Has adjustable magnetic overload. Available in 230 and 550 volts, non-reversing and reversing, open and explosion-tested enclosures. Optional features are skid mounting, ENSIGN motor disconnect plug, three-wire control and field rheostat.

Shown above are front and back views of 20-30 HP, 230 volt, DC, heavy-duty, non-reversing starter. It has standard enclosure with circuit breaker disconnect and three-point acceleration. Heavy steel enclosures have removable front and back covers.

Write for Ensign Bulletin 5390.

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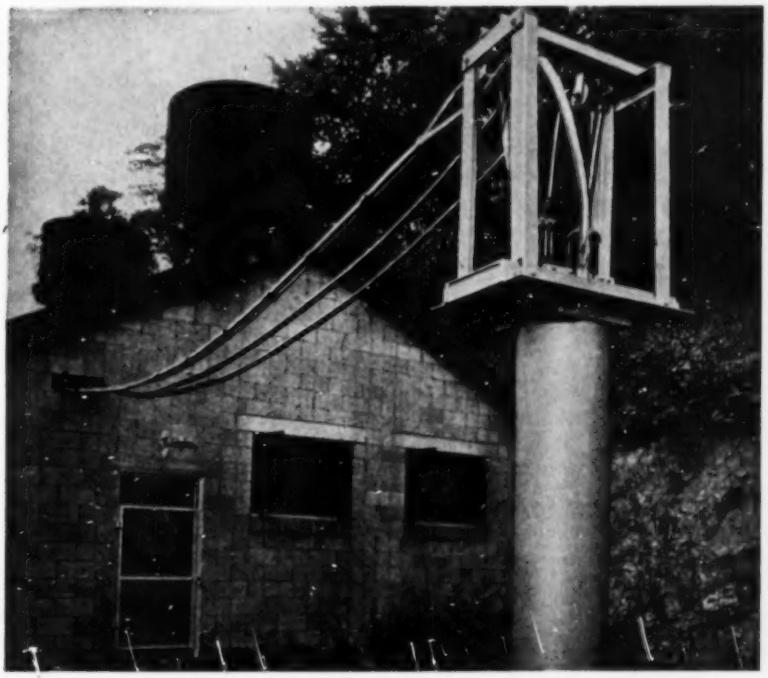
COAL MEN ON THE JOB . . .

MOREA STRIP MINE, Morea, Pa., operated for Weston Dodson & Co., Inc., by J. Robert Bazley, Inc.: M. L. Loverlick (left), stripping foreman, and George Thomas, project engineer.

Down come costs.....

with U. S. aluminum borehole cable

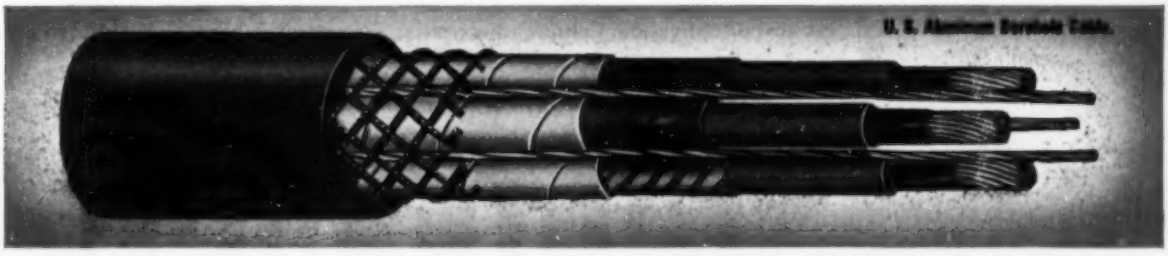


● Insulated aluminum cable costs *less* than copper cable and *far less* than armored copper cable. Aluminum needs no supporting armor because it can easily support its own light weight in boreholes of great depth. A 500,000 CM insulated aluminum cable is *less than half* the weight of an identical copper cable. It is furthermore easier to handle and its light weight speeds up every operation connected with its installation. It also makes possible fewer, simpler lower-cost supports.

United States Rubber Company is the only manufacturer of wire and cable that grows its own natural rubber and makes its own synthetic rubber and plastics. This quality control means the ultimate in electrical insulation.

COMPARISON OF THE CURRENT-CARRYING CAPACITY, WEIGHT AND RESISTANCE OF SELECTED COPPER AND ALUMINUM WIRES AND CABLES

	Open-Air Current-Carrying Capacity Amperes		Weight Per 1,000 Ft., Pounds		Resistance 1,000 Ft., 25 Deg. C Ohms	
	R Copper	RH Aluminum	R Copper	RH Aluminum	Copper	Aluminum
2/0.....	225	222	541	274	0.0842	0.134
4/0.....	300	302	816	380	0.0525	0.0843
500,000.....	515	520	1,831	787	0.0222	0.0357
750,000.....	655	660	2,716	1,129	0.0148	0.0238
1,000,000.....	780	785	3,546	1,437	0.0111	0.0178
1,250,000.....	890	895	4,400	1,699	0.0089	0.0145



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Electrical Wire and Cable Department

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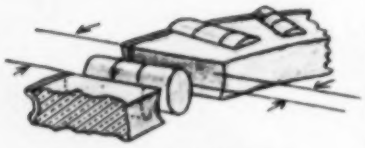
That's why, in any given dimensional limit, Rollway Thrust Bearings give you more efficient, heavy-duty service and increased bearing life.



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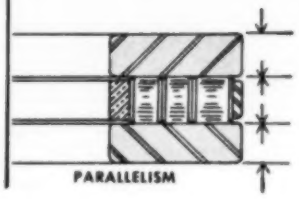
Accurate parallelism between the rollers and the matched thrust plates is repeated in the parallelism between the separator slots and the rollers themselves—all adding up to quiet, smooth rolling.



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Rollway Thrust Bearings offer the widest selection in types and sizes, available for quick replacement through Authorized Distributors. See your classified 'phone directory for name.

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- *quickly*
- *economically*

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Duff-Norton supplies the head and handle
2
You supply the pipe to save freight, time and money
3
Add the Duff-Norton base of your choice and you have the perfect Mine Roof Jack

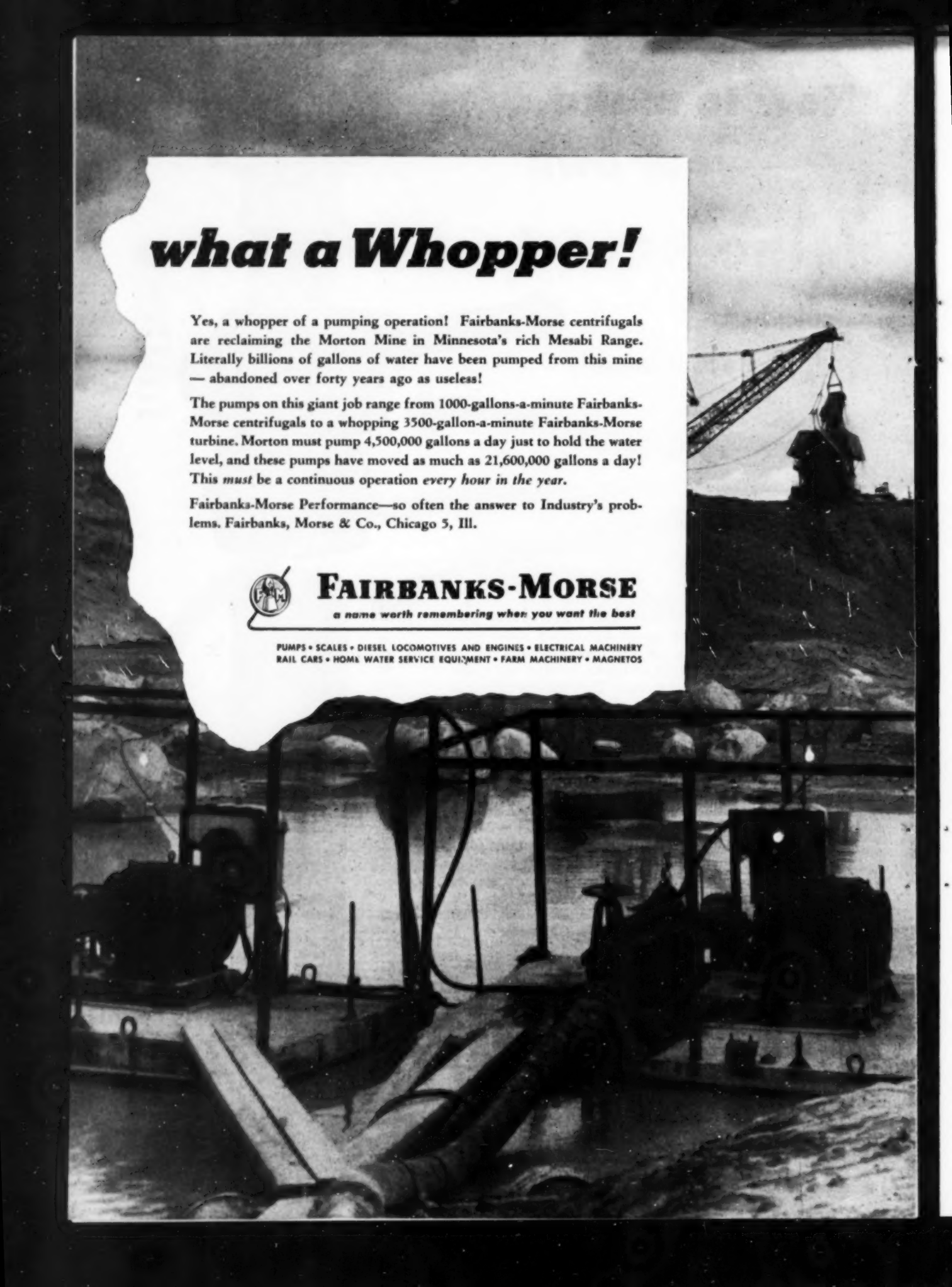
Here's all you do—(1) cut any 2-inch standard steel pipe into lengths desired and (2) attach safe, strong, dependable Duff-Norton head, handle and base fittings. That's all!

You can choose the type of heads, handles and bases best suited to your particular needs. They are available in a variety of types in both 8 and 16-ton capacities (16 ton requires 2-inch *extra strength* pipe). All fittings are painted light grey for better visability.

For complete information on Duff-Norton Mine Timbering and Roof Jacks and Fittings see your local distributor or write the world's oldest and largest manufacturer of lifting jacks for your free copy of 8-page catalog, "A Handy Guide for Selecting Duff-Norton Mine Jacks That Meets Every Modern Mining Need." This catalog contains complete information not only on Mine Roof Jacks but other popular Duff-Norton Jacks for useful trouble-free service in and around coal mines. Ask for catalog AD-10J, The Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

DUFF-NORTON *Jacks*

"Giving Industry A Lift Since 1883"



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The pumps on this giant job range from 1000-gallons-a-minute Fairbanks-Morse centrifugals to a whopping 3500-gallon-a-minute Fairbanks-Morse turbine. Morton must pump 4,500,000 gallons a day just to hold the water level, and these pumps have moved as much as 21,600,000 gallons a day! This *must* be a continuous operation *every hour in the year.*

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Special Cranes
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Mine Hoists
Skip Hoists
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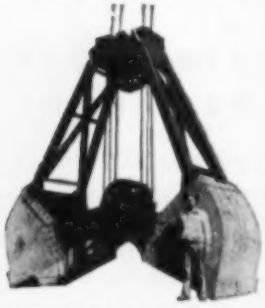
Wellman ore and coal handling bridges

give fast and efficient operation

One of two 6-ton Coal Handling Bridges in this installation.



6-ton Wellman Williams Type Coal Bucket used with these bridges.

● Take advantage of Wellman's long experience in designing and building handling bridges of many types and capacities. Your selection from the complete line will provide fast and efficient handling of coal or ore. Wellman equipment, in service the world over, is recognized for its long life and dependable service. It is backed by more than half a century of engineering experience.

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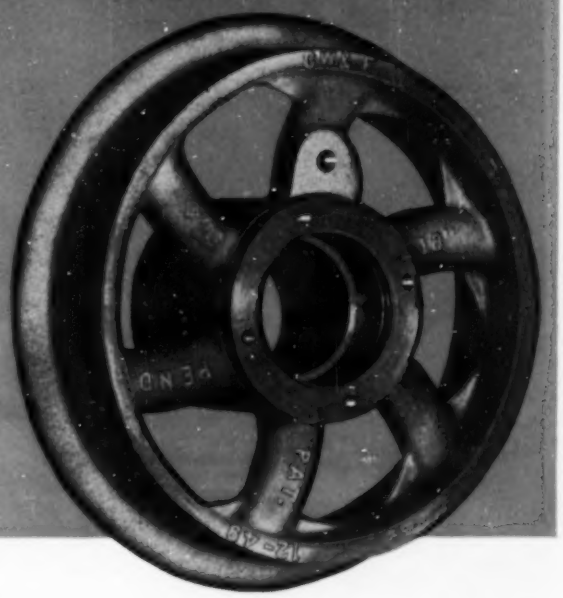

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Sterling's exclusive balanced design cast *steel* wheels reduce vibration, prevent costly wear and tear on tracks and cars alike.

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Sterling cast *steel* wheels are precision engineered to give you far smoother transportation, greater mileage at less cost.

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Although Sterling cast *steel* wheels cost more than other types your *replacement* cost is actually *lowered* when you use the money-saving Sterling re-wheeling plan.

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Transportation breakdowns can not only be expensive, but hazardous. A crushed wheel, derailed cars, a smashed locomotive can take the profit out of *any* mining operation. That's why STERLING STEEL CASTING COMPANY developed the exclusive balanced-design cast *steel* wheel, an engineering masterpiece that is your best assurance for dependable, low maintenance, trouble-free transportation. Aside from the great safety factor, in the long run Sterling cast *steel* wheels actually cost you *less* than any other type of wheel on the market today.

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The secret of Ruberoid Insulating Tape's great strength and durability lies in the high standards employed in manufacturing. Compared with A.S.T.M. specifications, Ruberoid gives you a bonus of 300% in adhesiveness, 26% in tensile strength and 290% in dielectric strength.

If you would like more complete information on the advantages and economies that Ruberoid Insulating Tape offers your mine, see your nearest Ruberoid dealer or write us direct. The Ruberoid Co., 500 Fifth Avenue, New York 36, N. Y.

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ASPHALT AND ASBESTOS BUILDING MATERIALS

Germanium in Coal: New Moneymaker?

ANY IN YOUR MINE?

If it's there, as germanium dioxide, and if you can recover it, you can sell it in today's market for $142 per pound. Refined to pure germanium, it's worth $340 per pound. The electronics industry will buy all you can offer and will make transistors and diodes of it.

But it's not easy or simple. You won't find germanium in all coals. If you do find it, you can't be sure you'll keep on finding it as your headings advance. Besides, since it's most easily recovered from ash, you can't very well sell your coal and have your germanium too.

At any rate, that's how things look now. The facts appear in a little booklet, Circular 272, recently issued by the U. S. Geological Survey. The title is *Concentration of Germanium in the Ash of American Coals: A Progress Report*. The authors are Taisia Stadnichenko, K. J. Murata, Peter Zubovic and Elizabeth Hufschmidt. You can obtain a copy free upon request to The Director, Geological Survey, Washington 25, D. C.

The report tells results of analyses made for germanium in the ashes of over 700 samples of American coals. The following are some of the salient facts brought out:

1. Though other searchers in various parts of the world have found from 0.1 to 1.0% germanium in the ash of certain coals, the ash of most coals contains less than 0.01%.

2. The richest commercial coal—richest in germanium, that is—is the bottom horizon of the Lower Kittanning bed of Pennsylvania age in Ohio, the ash of which contains 0.2% of germanium.

3. Usually the top and bottom layers of a coal bed show the highest concentration of germanium.

4. Germanium is most highly concentrated in vitrain; less in fussain. There is no detectable concentration in pyrite or sphalerite.

5. Out of 989 analyses, germanium was detected in 539. The percentage varied greatly from locality to locality. In Pennsylvania, germanium was found in 22% of the coals analyzed; in eastern coastal plain lignites, 95%.

6. Germanium content of the Lower Kittanning bed varies from 10 to 127 grams per ton; that of the Middle Kittanning bed, from 2 to 32 grams.

7. It is possible through carefully controlled gravity separations to obtain fractions of coal that are low in fusain and high in vitrain. The vitrain fraction would be the most favorable raw material for commercial recovery of germanium.

"New Books for Coal Men"—a review of current books, USBM investigations and other publications available—is a regular feature in the Coal Age news section. It begins on p 198 of this issue.

Confidence...

A STATE OF MIND THAT

GOES WITH **J&L WIRE-ROPE**

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because J&L stands for:

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ANY KIND - ANY TIME ANYWHERE

For more than sixty years Sprague & Henwood, Inc. has been a leader in the field of Contract Diamond Drilling. During this long period our crews have completed thousands of contracts successfully in every corner of the globe — under every conceivable operating condition.

From shallow holes to depths of more than a mile — in regions so remote that men and equipment were delivered by float planes — from barges on lakes and rivers — in mountain terrain so wild that mule-back transportation was required — from the blazing tropics to the sub-zero arctic — our crews have overcome every difficulty and completed their assignments to the customer's satisfaction.

Today, we have a large force of experienced operators and supervisers and an ample supply of modern equipment for every drilling requirement, so that we can undertake almost any job — anywhere — on very short notice.

Besides exploratory drilling for coal and ore, from the surface or underground, our contract service includes blast-hole drilling, directional drilling, foundation test drilling, grout holes and pressure grouting. Estimates, and constructive suggestions whenever possible, submitted promptly on request.

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Manufacturers, also, of high-speed diamond drilling machines, diamond bits and complete accessory equipment write for catalog.

BRANCH OFFICES: NEW YORK - PHILA. - PITTSBURGH - GRAND JUNCTION, COL. - BUCHANS, NEWFOUNDLAND

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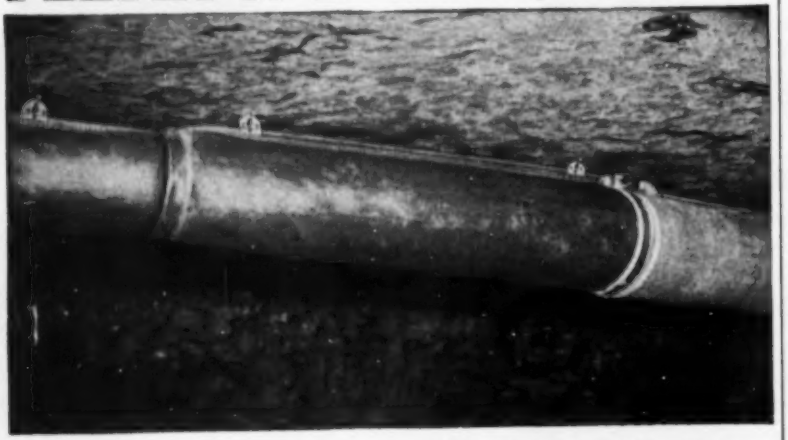
FLEXIPIPE® the quality ventilating tubing



Flexipipe is now available with Rope Seam Suspension *at no additional cost.* The newest, best, quickest suspension . . . eliminates special accessories and suspension wires . . . *all you need is a nail.* It equalizes strain on the tubing.

Flexipipe is efficient, serviceable, economical. Jute and heavy-duty grades available in a variety of lengths and diameters to meet your requirements.

Write for complete information and sample.

Bemis Bro. Bag Co.

408-O Pine St.,
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BRIEFS . . . Begin on p 135

UMWA Pledges Co-operation in Anthracite Market Promotion

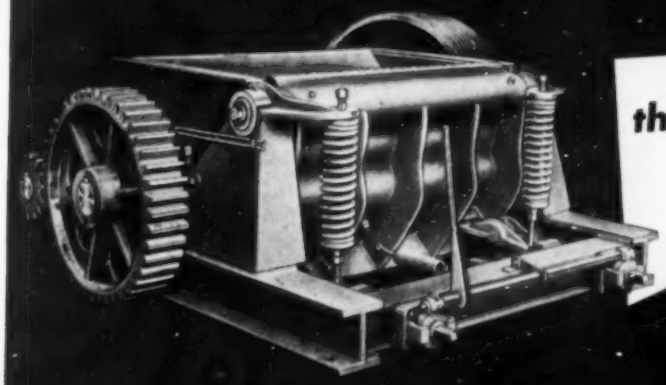
In a message to the annual meeting of the New York State Fuel Merchants' Association held Sept. 17-18, John L. Lewis, UMWA president, reported that the union would join in the industry-wide program to improve service to anthracite consumers and broaden the distribution of modern automatic burning equipment announced in August (*Coal Age*, September, p 135). In his message, Mr. Lewis said: "The united anthracite industry program is a step in the right direction. Fundamentally, the anthracite industry is basic not only to Pennsylvania, but to the anthracite consuming territories and can always be depended upon to handle fuel requirements in those consuming areas. This is not true of liquid fuel or natural gas, which are sometimes adversely affected by international repercussions. The UMWA has faith in the anthracite industry and believes it will eventually come into its own . . . The UMWA will cooperate in your efforts to attain the splendid objectives of the united anthracite industry program."

695 Mine Firms Produce 85%

Less than 11% of the estimated 6,500 coal companies in the United States produced 85.27% of the total tonnage mined in 1952, according to a recent statistical study by *Keystone Coal Buyers' Manual*, a *Coal Age* affiliate. The 695 companies produced 396,490,243 tors and the top 50 mining organizations accounted for an even 50% of the output, the *Keystone* figures reveal. Pittsburgh Consolidation, the largest commercial producer, is estimated to have mined 5.5% of the total 1952 tonnage, and U. S. Steel Corp., the largest captive, 4.1%.

Arrest 44 W. Va. Miners In Organizing Drive

Forty-four men were arrested in Braxton County last month, following stoning of a coal truck driven by a non-striker near Sutton, W. Va., Sept. 11. The incident was one of two outbreaks of violence reported that weekend as a result of a strike of some 90 workers of the Irish Ridge, Wolf Creek and Long coal companies which began Sept. 1. A diesel-power unit of the Irish Ridge company was destroyed in a pre-dawn dynamite explosion Sunday, Sept. 13, with damage estimated at $9,000. Some 60 miners were picketing the operations daily until an injunction against picketing was issued Sept. 12 by Circuit Judge C. A. Duffield. The arrested strikers were released on bond shortly afterward and bound over to the November grand jury, except for one man jailed on charges of violating the injunction. According to reports, the strikers are seeking recognition of the UMWA as their bargaining agent. No leads on dynamiting of the diesel unit were immediately available, state police reported.

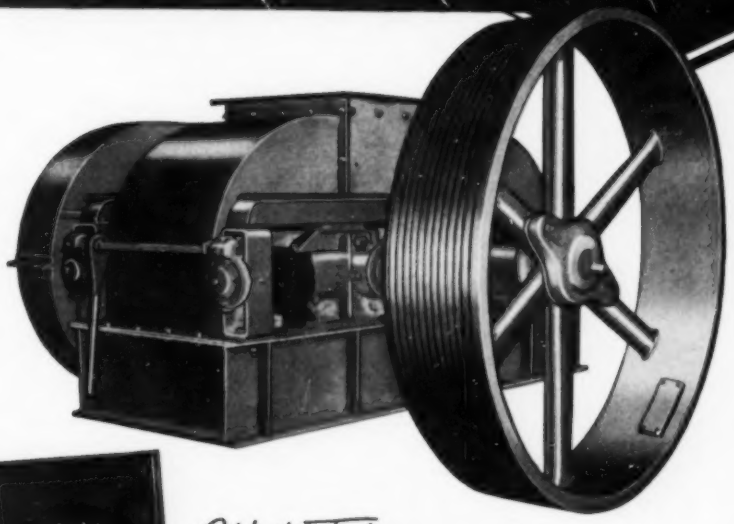


the EFFICIENT ECONOMICAL and PRACTICAL WAY

McLANAHAN

Single and Double Roll

BLACK DIAMOND CRUSHERS



Used extensively throughout the anthracite and bituminous coal fields, these dependable McLanahan Black Diamond Crushers crack large or small lumps of coal or other materials to desired size with a minimum of fines. These machines are the answer to your coal crushing problems, and are built to handle high tonnages. Available in numerous sizes and types, these single and double roll crushers are constructed of steel, semi-steel, or fabricated steel, with babbitt or bronze bearings for a long life of satisfactory service.

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for Bulletin
BD-457

McLANAHAN & STONE CORPORATION
Pit, Mine and Quarry Equipment Headquarters Since 1835
Hollidaysburg, Pennsylvania

Dependable Products: Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apron Feeders, Roll Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Steel Log Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Sprockets, Sheaves, Rollers, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.

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COAL RECOVERY DRILL

Using Augers 24 Ft. Long

Mining Low-Cost Quality Coal

These machines are built in a complete line of sizes using augers of 24, 30, 36, 42 and 48-inch diameter by 24 ft. long.

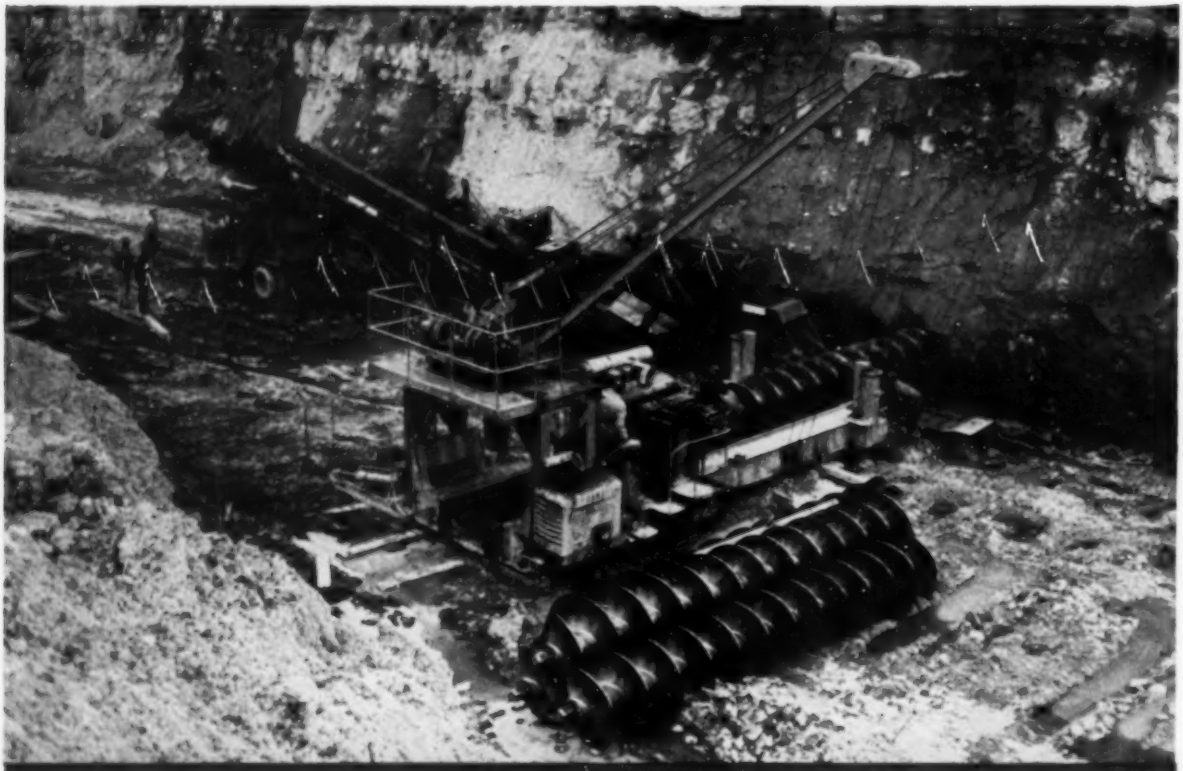
The modern **McCarthy Drill** is the unit you need for efficient operation in today's competitive coal market . . . it cuts coal mining costs.

The Salem Tool Company also produces coal recovery drills using 6-ft. and 12-ft. long augers in diameters of 16 to 48 inches to suit your needs. Write **The Salem Tool Company** for complete information.

Only 34 feet long and 12 feet wide . . . will operate in narrow pits.

All-around clear vision for operator . . . unobstructed view of highwall.

Heavy-Rugged-Powerful



(Located in Northern West Virginia)

THE SALEM TOOL COMPANY

763 SOUTH ELLSWORTH AVENUE • SALEM, OHIO, U. S. A.

Kentucky Indictment Upheld

A defense motion seeking dismissal of a federal indictment charging 36 UMWA members with conspiracy as a result of organizing disorders in Clay and Leslie counties, Kentucky, was overruled Sept. 8 by U. S. Judge H. Church Ford, in Lexington, Ky. The indictment, returned May 1, followed the long inquiry into unrest in the area by a federal grand jury last spring and charged conspiracy to deny certain citizens the right to refrain from joining a union. In his ruling, Judge Ford said that the indictment was good and that the rights involved were those of citizens. The union had contended that the bill did not state facts sufficient to constitute an offense against the United States, that it was not returned within 6 mo after the alleged offense and that the rights involved were not secured by the Constitution or federal laws.

And For Your Information . . .

Some 25% of the exhibitors expected to participate in the 1954 Southern Appalachian Industrial Exhibit have already signed up and all the space available should be taken before the end of the year, W. L. Osborne, show chairman, reported last month. More than 250 booths and exhibits are being planned for the show, set for May 26-28 in Bluefield, W. Va.

The Gunn-Quealy Coal Co. is opening a new deep mine on its property at Quealy, Wyo., some 5 mi from Rock Springs. To be known as the Rainbow No. 2 mine, the operation will be fully mechanized and produce 1,000 tpd in an area formerly stripped by the company but no longer economically minable by that method. Five underground openings are being driven from the highwall.

Observance of "Cleaner Air Week" has been set for Oct. 18-24, the Air Pollution Control Association reports. Various organizations and individuals in the coal industry support the annual project. R. L. Ireland, of the Pittsburgh Consolidation Coal Co., is a member of the association's board of directors.

The Wyoming mine of the Red Jacket Coal Corp. is the latest operation reported to have completed 100% training in the USBM Accident Prevention Course. The 464 men and officials of the mine were honored at ceremonies at which a Bureau representative presented its certificate and C. E. Jones, safety director, UMWA District 29, awarded the union's certificate to the president of the local. Speakers included William M. Ritter, Red Jacket president; J. J. Plasky, training and safety director; and Charles R. Ferguson, UMWA safety director.

The newly organized P. & D. Coal Co., affiliated with the Fourseam Coal Corp., has opened a new deep mine near Whitesburg, Letcher County, Ky., shipping via the L. & N. It is a slope operation, mining the Elkhorn No. 3 seam, and will have a capacity of 1,900 tpd. Norman Downard, vice president and general manager of the Fourseam Coal

GUYAN
"Venta-Mine"
FANS

The Ideal FAN
for economical
low pressure mine
ventilation.

Guyan Venta-Mine Fans are of sturdy, simple construction with a channel ring housing and electric welded angle cross members and vertical center angle supports.

These Fans are available in four sizes—36", 48", 60" and 72". Blades on all sizes are cast aluminum. The 60" and 72" diameter fans have hubs of high grade cast iron so arranged that blades may be pitched at different angles. The 36" and 48" diameter blades are cast solid and therefore are not adjustable. The shaft extends each side of fan so that driver may be installed on either side.

For complete construction details write for GUYAN catalog.

GUYAN MACHINERY CO. LOGAN, WEST VA.

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Durakool
Factory Set
Timer Relays

FACTORY SET, TAMPER-PROOF TIMING

Practically non-breakable, Durakool **Factory Set Timer Relays** have more than proved themselves on the roughest and toughest jobs that could be found. Year by year, their use increases in sensational fashion.

Controlled time available from .15 to 20.0 seconds in either normally open or normally closed actions. No waiting. Your production schedule is met.

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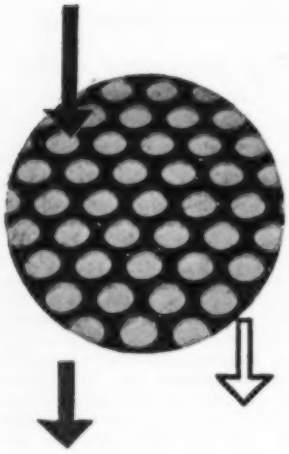
- ★ No chatter
- ★ Quiet in operation
- ★ Low in cost

DURAKOOL, INC., Elkhart, Indiana
50 St. Clair Ave., W., Toronto

Durakool ALL-STEEL MERCURY Timers

In Coal Preparation

it's the SIZE that counts!



You can rest assured your material will be accurately sized if you use Hendrick Perforated Plate on vibrating and shaking screens. With Hendrick Perforated Metal Plate, screens last longer, openings remain uniform under constant, heavy-duty usage.

Delays due to costly blinding are reduced to an absolute minimum – decks can be changed easier, faster–and downtime for repairs is practically eliminated – when Hendrick Perforated Plate is used.

Available flat, corrugated or stepped with any desired shape and size of perforation in proper gauges of regular, high carbon, and high tensile steels and in other commercially rolled metals. Write for more details.

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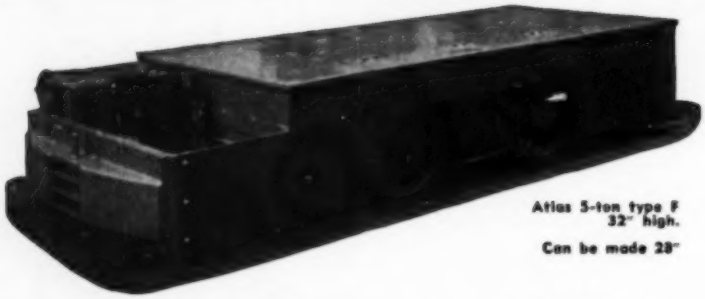
41 DUNDAFF STREET, CARBONDALE, PA.
Sales Offices in Principal Cities
PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE-SLOT SCREENS
ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING • SHUR-SITE TREADS • ARMORGRIDS

MOVE MORE COAL AT LESS COST



Atlas 5-ton type F 32" high.
Can be made 28"

The Atlas two-motor 5 ton type F storage battery locomotive is built low to go anywhere mine cars will go. Exposed wheels for easy access. Large battery capacity gives more gathering service per shift. Double reduction spur gear drive in heavy dust-tight housing gives economical maintenance-free service. Ask for details today!

Atlas Engineering service will design locomotives to meet the specific needs of your mine.

THE ATLAS CAR & MFG. CO.
ENGINEERS MANUFACTURERS
1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

Sales, Inc., is president of the company, and sales will be handled by a new organization, the P. & D. Coal Mining Co., also headed by Mr. Downard.

New area medical director at the Johnstown, Pa., office of the UMWA Welfare and Retirement Fund is Maj-Gen. Paul H. Streit. General Streit, before his recent retirement, was commanding officer of the Army Medical Center and Walter Reed General Hospital, in Washington, D. C., and also headed large army hospitals in California and Texas.

An International Conference on the Complete Gasification of Coal, to be held in Liege, Belgium, May 3-8, 1954, will have discussions in three languages, French, English and German, with simultaneous translation. The meetings will be followed by visits to the principal gasification plants of Western Europe. Information may be obtained from Inichar, 7 Boulevard Frere Orban, Liege, and reports should be sent there also before Jan. 1 so that they may be reproduced and sent to those intending to take part.

"Depreciation, Deterioration and Obsolescence" is the title of a new leaflet the government has issued to explain how businessmen should deal with depreciation on a reasoned, analytical basis and provide concise and useful background information to permit handling of specific situations in a plant. The National Coal Association is offering copies to members.

Coal Required for Modern Products

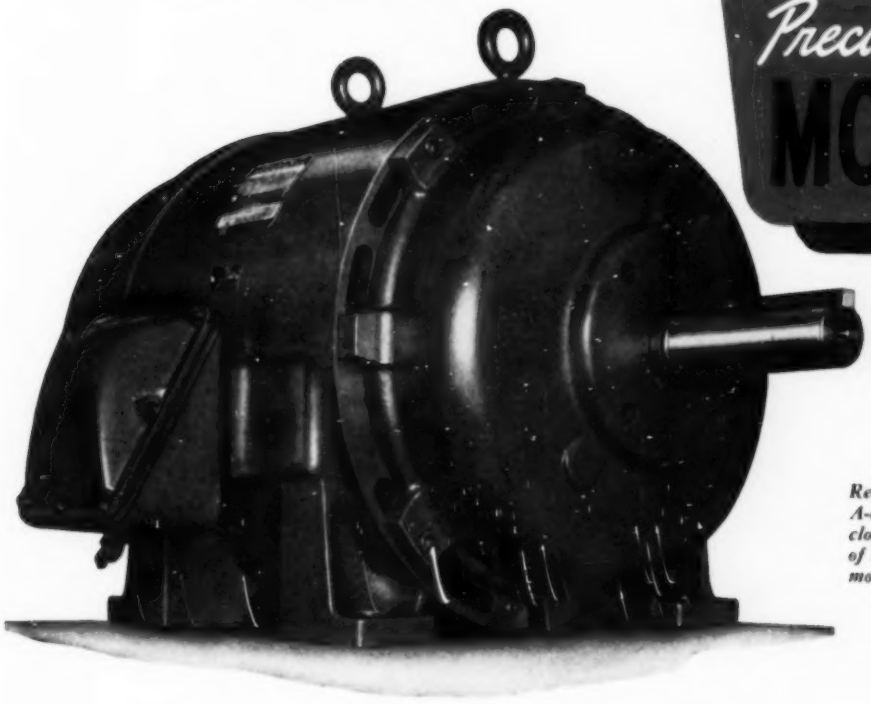
PRODUCT	COAL, LB
Automobile	4,609
Bicycle, Man's	90
Bus, 50 Passenger	16,793
Combine, Grain	8,879
Freight Cars:	
50-Ton Box	54,002
70-Ton Hopper	68,822
50-Ton Flat	61,958
Hay Baler, Pickup Type	4,832
House, 6-Room	11,027
Lathe, Turret	10,473
Lawn Mower	36
Locomotive, Diesel-Electric	260,910
Motor, ¼-Hp Electric	25
Motor, 5,000-Hp Electric	231,400
Piano	289
Refrigerator	224
Sleeping Car, Railroad	150,361
Tractor, Farm	2,006
Washing Machine	49

Based on steel and iron requirements as reported by the American Iron & Steel Institute.

FOR CLEANING-PLANT SERVICE...

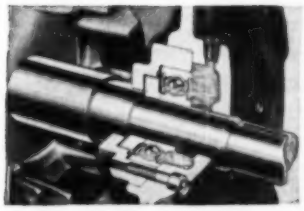
"All motors are NOT alike!"

RELIANCE *Precision-Built* **MOTORS**



Reliance Totally-enclosed Fan-cooled A-c. Motor. All other standard enclosures available, with wide choice of mechanical designs and special mountings. Ratings from 3/4 to 300 hp.

- ☆ **Tough, vibration-proof Reli-X insulation**
- ☆ **Heavy dust-proof conduit-box and motor lead assembly**
- ☆ **Shock-resistant frame and bearing-bracket construction**



. . . AND THE BEST PRE-LUBRICATED BEARING DESIGN

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1459G

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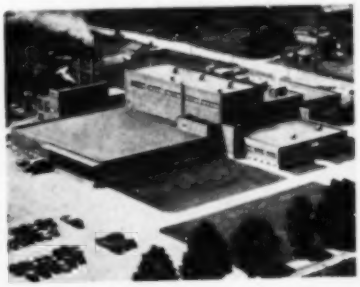
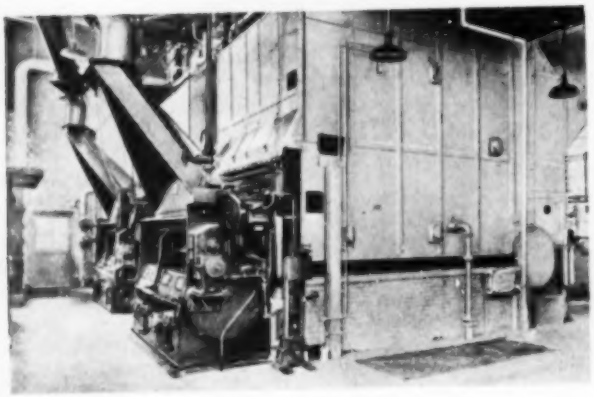
Each month, full-page messages like the one shown below—featuring either "off-track" or "on-track" installations—appear in the pages of *Business Week, Nation's Business* and a carefully selected group of power journals and trade magazines.

"COAL'S BEST FOR OUR MODERN PLANT!

It's low in cost... It's clean and convenient!"

says G. W. Peters, Engineering Manager
M&R DIETETIC LABORATORIES, INC.
makers of PREAM & SIMILAC





"We made a careful study of fuels and burning equipment before building our modern new plant in Sturgis, Michigan. This plant was designed to produce baby food. So the steam plant has to be clean and dust-free as well as economical to operate. Also, we wanted a fuel we could store safely and easily in order to insure ourselves against any shortages.

"We decided on bituminous coal—and the up-to-date installation shown here. It certainly fills the bill on every count. Our modern combustion equipment makes coal far more economical than any other fuel. Up-to-date coal and ash handling give us convenient operation completely free of dust nuisance."

Additional case histories, showing how other types of plants have saved money by burning coal the modern way, are available upon request.

Discover for yourself the great advantages of coal burned the modern way. Call in a consulting engineer. He'll show you how today's combustion equipment can give you 10% to 40% more power from a ton of bituminous coal than from equipment used only a few years ago. He'll show you how modern labor-saving coal and ash-handling equipment make a coal-fired installation clean, convenient, and dust-free.

If you plan to remodel or build a new plant, be sure to look into the low cost and convenience of bituminous coal. Consider coal's other advantages, too. It has reserves that are virtually inexhaustible. America's bituminous coal mining industry is the most efficient and productive in the world. With bituminous coal, you can be sure of plenty of fuel at relatively stable prices now and for years to come.

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BITUMINOUS COAL is most places is today's lowest-cost fuel, and coal reserves in America are adequate for hundreds of years to come.

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

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A Department of National Coal Association
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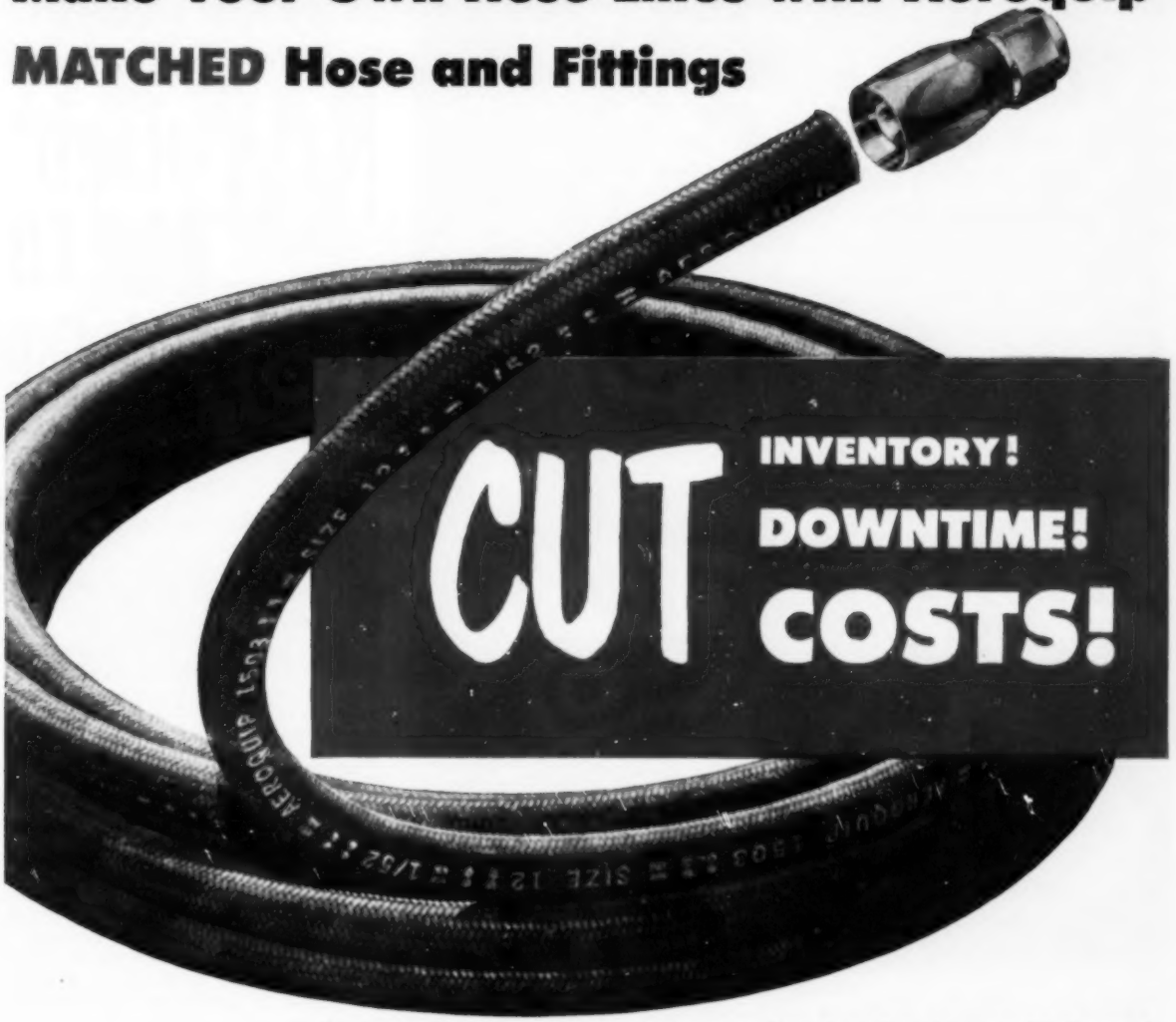
FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

Make Your Own Hose Lines with Aeroquip

MATCHED Hose and Fittings



Aeroquip Fittings are designed, developed, and produced to go with Aeroquip Hose. They form such a foolproof combination that Aeroquip *guarantees* performance. Thus, the hose lines made right in your own plant always measure up to Aeroquip's exacting standards of quality, the highest in the industry. A small supply of Aeroquip Bulk Hose and Fittings assures you of quick hose line replacements at all times . . . and Aeroquip Fittings are detachable and may be used again and again when making new hose assemblies.

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DUMP a heavy shovelful of rock into a Heil body! It takes the punishing shock in stride . . . comes back for more, shift after shift, year after year. The 2" hardwood cushion sandwiched between the body bottom and wearing plate absorbs load shock. Rigid reinforcing by box-member ribs, no-sag body construction and the many other Heil extra-strength features assure profitable operation on the toughest jobs. For cold weather work or sticky gumbo, Heil Bodies can be supplied with heated floor construction.

Heil fast-acting, simple, trouble-free hoists are designed for heavy-duty service.

See your Heil distributor for detailed information . . . and be sure to specify a Heil Body and Hoist for every truck.

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Factories: Milwaukee, Wis. — Hillside, N. J.

Sales Offices: New York, Union, N. J., Washington, D. C., Atlanta, Cleveland, Milwaukee, Detroit, Chicago, Kansas City, Denver, Dallas, Los Angeles, Seattle; Rio de Janeiro, Brazil.

BH-10

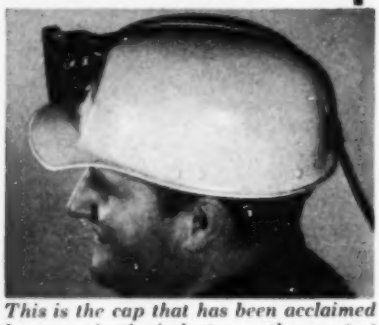
HEILINER 13 AND 18-CU. YD. SCRAPERS

HEILINER 20-CU. YD. BOTTOM DUMP WAGON

CONTRACTOR'S BODY

Designed
by coal miners
for coal miners

NEW HARD BOILED* Coal Miner's Cap



This is the cap that has been acclaimed by many in the industry as the greatest development in Coal Caps in years.

Designed for GREATEST PROTECTION! Built of rugged light weight Fiberglas. Surpasses all standard safety tests, and is approved by the state of Pennsylvania. Deep groove in crown secures lamp cable, gives more headspace, acts like a girder for extra strength. The flared raintrough edge, all around the hat, protects ears from being nicked and keeps water from running down a man's back. Fiberglas is flame resistant and passes dielectric tests eliminating all fear of electrical hazards.

Designed for "FELT HAT" COMFORT! Free floating hammock suspension guarantees a perfect fit always with plenty of room for air circulation. Headband size can be adjusted in just a few seconds or when needed completely changed with inexpensive leather or leatherette headbands.

FREE brochure on Bullard Safety Miner's Caps. Write

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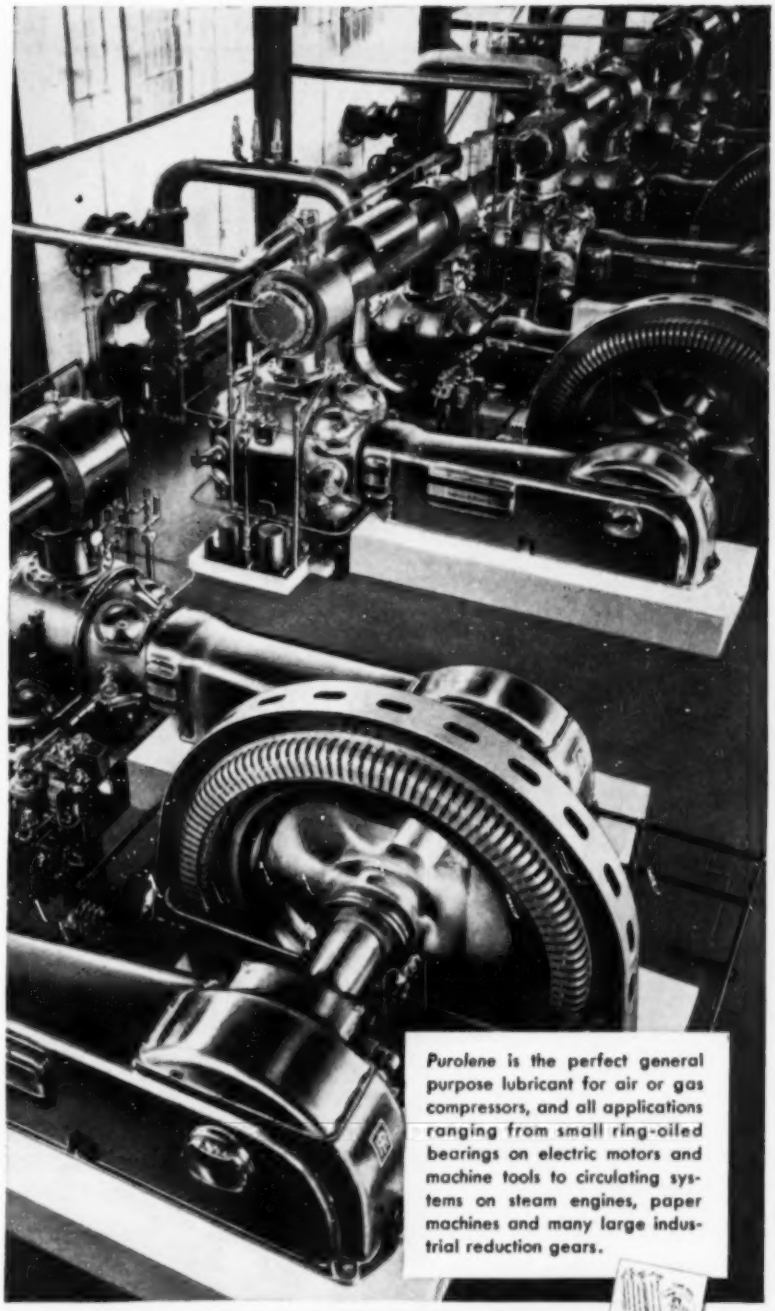
HARD BOILED

EVERYTHING BULLARD IN SAFETY

*T. M.'S REG. U. S. PAT. OF.

The Oil That Says:

"CAN DO!"



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Expertly refined from a superior paraffin crude, Purolene has 100 plus V.I., high flash and fire, low pour, high resistance to oxidation and offers protection against rust.

Purolene is one of a group of Pure Oil *multi-purpose* industrial lubricants, each designed to do many different jobs equally well. You can use them to simplify your lubrication practice and reduce your lubricants inventory.

So effective is the multi-purpose character of the lubricants in this group that *seldom more than six are needed to do the entire lubrication job for even a large plant!*

Learn how to use this versatile line to start a new labor-saving, money-saving lubrication program in your plant. Use the coupon below.

KEEP IT PURE AND SIMPLE!

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You get more—much more—than a machine when you buy a MARION. Some of the other important benefits for you:

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GOOD MACHINES — MARION has consistently pioneered the major refinements and developments in power shovel design and developments. These machines are built to the world's highest standards of quality.

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MARION **POWER SHOVEL CO.**
MARION, OHIO, U. S. A.

from ¾ cu. yd. to 45 cu. yds.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

Among the Manufacturers

Cardox Names Sales Managers

Cardox Corp., Chicago, has appointed Paul C. Manley as western sales manager and R. E. Gerdetz as eastern sales manager of the Mining Div., both with headquarters in Chicago. Joining Cardox in 1934 as a field engineer covering Utah, Wyoming and western Canada, Mr. Manley became district manager for Indiana and western Kentucky in 1946. Prior to joining Cardox in 1950 as assistant district manager for southern West Virginia, Mr. Gerdetz was sales engineer for the Joy Mfg. Co. and Jeffrey Mfg. Co.

H-R Elects Vice President

Hewitt-Robins, Inc., Stamford, Conn., has elected Austin Goodyear, general manager, rubber and conveyors divisions, a vice president of the company. Mr. Goodyear joined Hewitt-Robins in 1941, was appointed production manager of the Passaic (N. J.) plant 6 yr later and, in July, 1952, became general manager of the conveyors division and of the rubber division. Arthur W. Fasold has been appointed assistant manager, commercial research department, with headquarters in Stamford. Formerly a field engineer in Charleston, W. Va., specializing in coalmine conveyor systems, he joined Hewitt-Robins in 1947.

Carboloy Adds Two Salesmen

Carboloy Dept., General Electric Co., Detroit, Mich., has named Kenneth Williams, formerly superintendent, Pardee & Curtin Lumber Co., as coal mining tool sales representative in the Fairmont (W. Va.) area, with headquarters in Morgantown. Prior to his association with Pardee & Curtin, Mr. Williams was safety director at Weirton Steel Co., and one time an inspector for the West Virginia Department of Mines. Joseph Pushey, formerly drilling and blasting supervisor, Rimersburg Coal Co., Rimersburg, Pa., was appointed sales representative of coal mining tools in the central West Virginia area, with headquarters in Pittsburgh. From 1942 to 1947, Mr. Pushey was associated with the Bureau of Mines on explosive research.

MSA Promotes Myers

Charles H. Myers has been appointed assistant to the manager of the mining department, Mine Safety Appliances Co., Pittsburgh. Mr. Myers, with the company since 1939, formerly was a mining sales engineer in the Fairmont (W. Va.) area and has been succeeded in that post by M. E. Condit, previously in MSA's Pottsville (Pa.) mining sales office. The new MSA sales engineer in Pottsville succeeding Mr. Condit is W. C. Endean, who has been with the company's international department.

Dickson Heads Leschen Sales

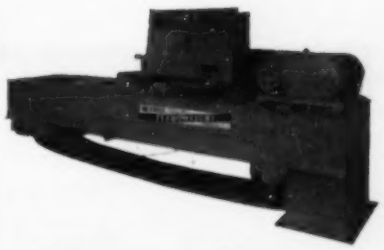
Leschen Wire Rope Div., H. K. Porter Co., Inc., St. Louis, has appointed Russel J. Dickson general sales manager. For the past 3 yr previous to his appointment ties, Mr. Dickson was Chicago district manager for Leschen.

Gardner-Denver Moves Rieman

C. H. Rieman, since 1951 sales manager of the Mining Div., Gardner-Denver Co., Quincy, Ill., has been named sales manager of its Mining and Construction Div. With the company since 1937, in various sales positions, Mr. Rieman assumed his new post on the retirement of R. H. Pearson, vice president and sales manager of the Construction and Oil Field Div.

ESB Sets Up Divisions

Electric Storage Battery Co., Philadelphia, has established two operating divisions—industrial and automotive—furthering plans, including improvement of physical facilities, which have been under development for several years. Roland Whitehurst, vice president and director, has been appointed general manager of the new industrial products division. Heading the new automotive products division as general manager is Robert L. Sommerville, formerly assistant general sales manager. Electric Storage Battery also has announced the appointment of L. M. Gay as manager of its Cleveland branch, succeeding W. P. Roche, who has taken a leave of absence



Yes-feed by weight

with the MERRICK FEEDOWEIGHT, a self-contained automatic conveyor scale, with automatic gate for feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Uniformly feeds bulk material BY WEIGHT; automatically totalizes weight of materials fed. Simple to operate. Slow moving parts mean long life. Easy to install, maintain.

Manufacturers of

The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveying operation. Complete descriptive matter on request.

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic Weighing Equipment
PASSAIC, N. J.

Flood City Gathering Type
PLUNGER PUMP

DEPENDABLE
COMPACT
STURDY

A light compact plunger type pump which will be found useful for many applications. The double acting reversible water end can be furnished in the material best suited for your application. The suction and discharge chambers are readily reversible to bring the pipe connections where you want them.
A novel feature is the cast iron sleeve which protects the power frame from wear at the crosshead fit. The power frame is self oiling and thoroughly shielded against entrance of liquid or dirt.
It is 42" long, 17" wide and has an overall height of 22". Total weight less motor is 260 pounds.

FLOOD CITY BRASS & ELECTRIC CO.
JOHNSTOWN, PA.
Branch Office:
4 Virginia St. W., Charleston, W. Va.

Here's a new geared-screw type Timber jack that's twice as fast as conventional screw types. It's easy to handle and economical for cross timbering with wood or steel, or as a safety prop under doubtful roof conditions. Its rotating head permits closer positioning to any vertical setting or rib. And it doubles as a maintenance jack for locomotives and cars when used in a pit.

The Simplex No. 642 features all the strength, durability and built-in safety for which Simplex is noted. Full six-

SIMPLEX 84A, 85A, 86A
Ratchet Lowering Jacks

Designed especially for thin, normal and thick seam work in coal mines. Ideal for lifting, moving mine machinery, track work, re-railing locomotives. 5-ton capacities.

WORLD'S LARGEST MFGRS. OF INDUSTRIAL
MECHANICAL AND HYDRAULIC JACKS

SIMPLEX
RE-MO-TROL UTIL-A-TOOL JACKS JENNY BOL-TOE

TEMPLETON, KENLY & COMPANY
2501 Gardner Road • Broadview, Illinois

to regain his health. Mr. Gay, who joined the company in 1918, has served as Cincinnati branch manager since 1926.

Chain Belt Moves Top Men

Chain Belt Co., Milwaukee, Wis., has advanced A. R. Abelt, formerly vice president in charge of field forces, to vice president-sales, with executive responsibility for general sales policies, sales promotion, distribution and marketing for all divisions of the company. He has been with Chain Belt since 1906. George W. Woodland has been appointed to the newly created post of manager of field forces for the company's industrial divisions. Joining Chain Belt in 1938, he was sales manager of the Chain and Power Transmission Div. prior to his advancement. Gilbert J. Schuelke, formerly assistant sales manager of that division, succeeds Mr. Woodland. William C. Messinger has been named assistant to A. K. Thomas, divisional manager, Construction Machinery Div. He was previously manager of the Ordnance Div. R. B. Krikorian succeeds Mr. Messinger. George D. Gilbert, company secretary and general manager of the Baldwin-Duckworth Div., has resigned after 35 yr of service to devote more time to personal affairs. Mr. Messinger, newly appointed assistant to the manager of the Construction Machinery Div., also has been elected secretary of the company to succeed him. Edward M. Rhodes, formerly assistant division and sales manager has been promoted to division manager, Baldwin-Duckworth Div., to succeed Mr. Gilbert in that capacity. Roland V. Poisson, assistant sales manager, has been appointed sales manager, Baldwin-Duckworth Div.

Penn Machine Elects President

Richard Wright, vice president and director, Penn Smokeless Coal Co., was named president of Penn Machine Co., Johnstown, Pa., at a recent board of directors meeting. Previously associated with Westinghouse Electric Corp. for 16 yr, Mr. Wright also is a director of Sun Drug Co. and McKinney Mfg. Co. His father, Thruston Wright, and John Gibson Jr. founded Penn Machine in 1920. Mr. Gibson has been the firm's only president and will continue to serve as a director of the corporation.

IH Picks Power Div. Staff

International Harvester Co., Chicago, has announced several changes in sales personnel in its Industrial Power Div. I. P. Payne has been appointed manager of sales, and C. E. Jones and W. M. Holland, assistant manager of sales. L. J. Lange has been made general supervisor of sales development, and E. A. Braker, general supervisor of sales engineering. In addition, three regional and assistant regional sales managers were named to direct sales activities within 20 territories recently established through consolidation of 60 former sales districts throughout the country. Western regional sales manager is H. E. Broadwell, with Jack Bess as assistant sales manager. Heading the central regional sales is L. A. Coomer, with W. F. Hall assistant regional sales

Cleaning up with SECO

BRUNS COAL COMPANY

BEVERLY, OHIO

PROGRESSIVE OPERATOR GETS 225 T.P.H. OF COAL IN MARKETABLE SIZES

Here is just one of the dependable Seco vibrating screens on the job for Bruns Coal Company. This 5' x 16' double deck type H Seco is a real workhorse when it comes to cleaning and sizing coal.

Hour after hour, month after month, 225 tons of R.O.M. hit this smooth operating Seco, and it doesn't faze it a bit, thanks to Seco's fully controlled true circular action.

The big lumps averaging 50 tons per hour are discharged off the top deck with 4" opening, approximately 65 tons per hour of minus 4" plus 1½" are discharged off the bottom deck with 1½" opening and approximately 110 tons per hour of minus 1½" are delivered through the bottom deck.

Mr. Bruns is very well satisfied with the performance of his Seco vibrating screens.

How about your operation? Are you getting the better profits that clean, properly-sized coal can bring you? May we show you how a Seco can do this for you for pennies per ton? Write, wire or phone today!

SECO

TRUE CIRCULAR ACTION

VIBRATING SCREENS

Do you have your copy

Seco Coal Bulletin No. 53

SCREEN EQUIPMENT CO., Inc.

1750 Walden Avenue

Buffalo 25, New York

Depth is Important in Surface Hardening

One unhardened and three surface hardened test blocks cut for inspection

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The exact depth of surface hardening is one of the most important factors in the exclusive PITTSBURGH **Armored Gear** formula. The metal, machining, and overall heat-treating are very important in the long service life of PITTSBURGH GEARS, and with surface hardening to the correct depth for the use the gears will be put to, you can expect unusually long service.

PITTSBURGH **Armored Gears** are guaranteed to give five times the life of untreated gears, one to one and one-half the life of oil-treated gears, and equal or longer life than any other gear in identical service. **Armored Gears** are quickly identified by their distinctive corrosion preventive coating of "**Pittsburgh Purple**."

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COAL MEN ON THE JOB . . .

J. ROBERT BAZLEY, INC., Port Carbon, Pa.—George Thomas (left), engineer, and Peter Canto, foreman, at Bazley's new Morea stripping.

manager. E. L. Boughton is manager and J. D. Gladden assistant manager of eastern regional sales.

Davey Rock-Drill Manager

Davey Compressor Co., Kent, Ohio, has appointed Paul H. Nast manager of the rock-drill division. Prior to joining Davey he was associated with The Worthington Corp. as product manager, air tool and rock drill divisions, and was with the Chicago Pneumatic Tool Co. and Sullivan Machinery Co.

Gar Wood Names Division Heads

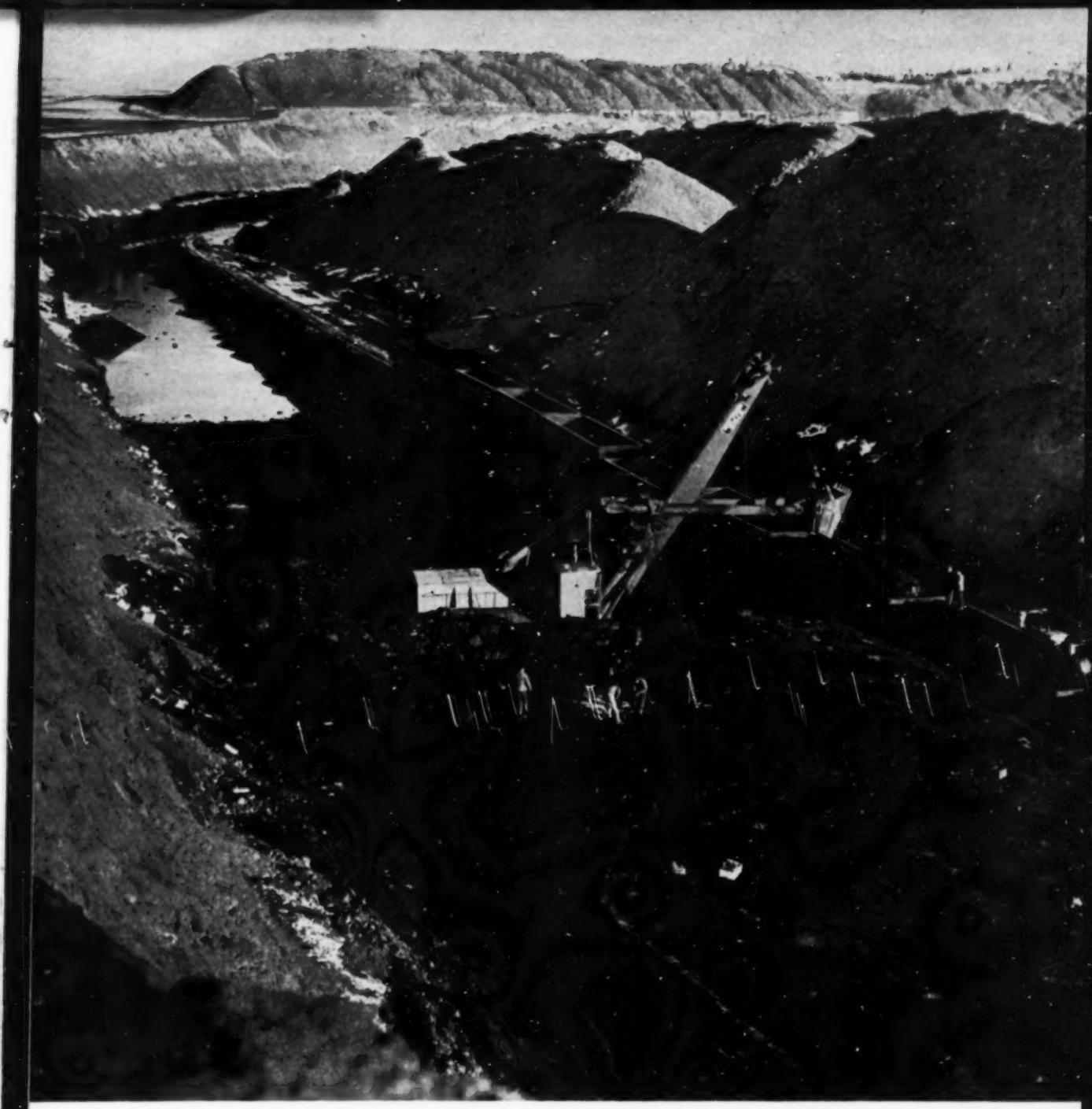
Gar Wood Industries, Inc., Wayne, Mich., has appointed Glenn C. Wilhide, recently retired from the United States Army, Wayne Div. manager, succeeding A. J. O'Brien, acting manager, who will resume his duties as vice president of manufacturing for the company. Mr. Wilhide, who on his retirement was commanding officer of the Detroit Arsenal, joins Gar Wood with broad executive experience in both civilian and military life. Gar Wood also has appointed Mark L. Shepard as manager of the Richmond Div., Richmond, Calif., succeeding J. B. Steed, who has been transferred to the company's main office in Wayne, Mich. Mr. Shepard, with Gar Wood since 1936, formerly served as chief engineer, St. Paul Hydraulic Hoist Div.

Heads Goodrich Tire Sales

The B. F. Goodrich Co., Akron, Ohio, has named P. W. Stansfield, manager, industrial tire sales, for the Tire & Equipment Div. With B. F. Goodrich since 1936, Mr. Stansfield was named to head up the retail sale of farm tires in 1939, and in 1947 was moved to passenger-car tire sales, a position he retained until his present appointment.

Oliver Acquires Centriclone

Oliver United Filters Inc., Oakland, Calif., in a continuing policy of expansion and diversification of its products,



IMPOSSIBLE WITHOUT EXPLOSIVES

During 1953, stripping operations will account for some 120 million tons of coal, or close to one-quarter of the total annual production. In extreme cases, deposits 150 feet or more below the earth's surface have been mined. For every five feet of coal thickness, an average of 39 feet of overburden first has to be removed. It's a job that never could be handled economically without explosives. Hercules has pioneered in developing the right types of explosives and has the service facilities to help solve any blasting problem concerning coal mining, metal mining, quarrying, construction, petroleum.

HERCULES POWDER COMPANY
INCORPORATED

Explosives Department, 936 King St., Wilmington 99, Del.

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Cal.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Cal.

XHSD-6

Inland Steel Slashes Costs with Koppers PRESSURE-CREOSOTED TIES

KOPPERS PRESSURE-CREOSOTED MINE TIES in service at Inland Steel's coal mine at Price, Kentucky. Inset shows entrance to mine.

DURING the past several years, Inland Steel Company has installed Koppers Pressure-Creosoted Ties and Lumber in this coal mine at Price, Kentucky. By using pressure-creosoted ties, Inland Steel minimized tie replacements and *guaranteed* fewer interruptions in their operations.

Annual tie costs were slashed, too. Had other than pressure-creosoted ties been used, yearly maintenance costs for Inland Steel would have become a serious problem.

Koppers strategically-located plants carry ample stocks of pressure-creosoted mine materials, thus assuring prompt shipments by rail or truck. To find out how Koppers Pressure-Creosoted Wood saves money for mine operators in many ways, send for our free booklet, "10 Proven Ways to Cut Mining Costs." Write for a copy today.

KOPPERS

KOPPERS COMPANY, INC.
Wood Preserving Division
Pittsburgh 19, Pennsylvania

PRESSURE-CREOSOTED WOOD

COAL MEN ON THE JOB . . .

A. B. C. COAL CO., Monterey, Tenn. —Tom Cruthers (left), mine electrician; and J. A. Alred, president.

has acquired all rights for manufacture, sales and service of the Centriclone from the former owners, Equipment Engineers, Inc., San Francisco. The Centriclone is an unusual combination of the conventional liquid cyclone and the centrifuge for separating solid particles of different sizes and specific gravities when suspended in a liquid slurry, the company reports.

Carlon Opens Oregon Plant

The Carlon Products Corp., Cleveland, has established facilities for the manufacture of plastic pipe and fittings in a new plant at Klamath Falls, Ore., to facilitate distribution in the Far West. Floyd Wilson will manage the new Carlon division, which is the seventh Carlon plant in the U. S.

N. Y. Belting Moves Managers

New York Belting & Packing Co., Passaic, N. J., has named William I. Butler, formerly manager, southeastern district, district manager for the east central states, with offices in Cleveland. William W. Conard, former southeastern district manager for L. H. Gilmer Co. before it merged with New York Belting & Packing a year ago, succeeds Mr. Butler, with headquarters in Atlanta. Malcolm B. Roach, sales engineer, has been appoined assistant manager, southwestern district, with headquarters in Dallas.

SPS Names Marketing Head

Standard Pressed Steel Co., Jenkintown, Pa., has advanced Raymond N. Gruber to director of marketing research, succeeding Robert A. Reese, resigned. Charles J. Betz succeeds Mr. Gruber as sales manager of the company's Unbrako line of products, and John W. Breitmayer, of the Unbrako sales staff, succeeds Mr. Betz as assistant sales manager of the line.

And For Your Information . . .

Euclid Road Machinery Co., Cleveland, has appointed Melbourne W. Miller, district manager for Montana, Alberta, Canada, North Dakota and parts of South Dakota. With Euclid 4 yr in the capacities of serviceman, special service represenative and field engineer,

these coals have *Sales appeal*

Let PERMATREAT COAL SPRAY *be your star salesman!*

Put more "sales appeal" in every load of coal you ship, whether for industrial or domestic markets. You'll better your competition and have more pleased customers if you treat all your coals with PERMA-TREAT COAL SPRAY.

The home user definitely wants dust-proofed coals. Your dealers are quick to appreciate the advantages of freeze-proofing and the sales appeal of a better looking coal. Coals weather-proofed with PERMA-TREAT resist degradation and changes in characteristics in the stockpile. Metallurgical plants find them better for coking and fusing because of uniform bulk density and less segregation in the stockpile.

Phone an Ashland PERMATREAT representative. He will be glad to lend our many years experience as the largest supplier of oil spray materials to the coal industry.

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PERSONAL CAR

ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky

AIRFLOW
INDICATOR SWITCH

• Here's a dependable mercury tube type switch to be used with battery and bell to sound an alarm in the event of ventilating fan failure. Switch is also available for 110 or 220 volt A.C. and may be used with suitable light, bell or horn. . . . The switch is designed for installation in the exhaust air flow of fan. . . . Write for full descriptive bulletin.

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MACHINERY COMPANY
LOGAN, WEST VIRGINIA

Kleenslot
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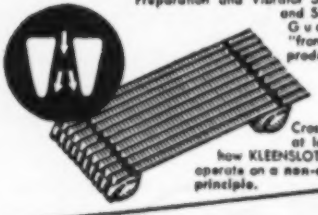
PREPARATION
SCREENS

FOR DEWATERING, SIZING AND SCREENING OPERATIONS

The mining industries can't afford to overlook this product. Accurate openings, great strength, long life and economy makes WEDGE-WIRE Preparation and Vibrator Screens and Screen-Guards "front line" products.



Cross section at left shows how KLEENSLOT Screens operate on a non-clogging principle.

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Gentlemen:
Please send us literature outlining the superiority of Wedge Wire construction.
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SEND FOR OUR ILLUSTRATED LITERATURE

Wedge-Wire
CORPORATION
5608 CLARK AVENUE
CLEVELAND 2, OHIO

he will supervise Euclid activities of equipment distributorships.

Reliance Electric & Engineering Co., Cleveland, has appointed Thomas J. Lisy application engineer in its Pittsburgh (Pa.) sales office. A graduate of Case Institute of Technology, Mr. Lisy joined the Reliance organization earlier this year.

Boston Woven Hose & Rubber Co., Cambridge, Mass., has opened a new warehouse at 685 Metal Rd., N. E., Atlanta, Ga., as part of its program to provide southeast customers with 24-hr service and delivery of its products. Terry Hayden has been appointed manager of the warehouse which will stock a complete line of Boston products.

The Heil Co., Milwaukee, Wis., has named H. J. Row as sales promotion manager of the Body and Hoist Div., acting as coordinator on promotional matters between the division and Heil distributors around the country. Prior to joining Heil, Mr. Row headed his own manufacturing company in Milwaukee.

Atlas Powder Co., Wilmington, Del., has appointed Dr. Russell G. Dressler technical assistant to Ralph K. Gottshall, president, with headquarters in Wilmington. Prior to joining Atlas Powder, Dr. Dressler was with the U. S. Bureau of Mines as chief of its gas-synthesis demonstration plant at Louisiana, Mo.

Republic Steel Corp., Cleveland, has named Joseph K. Bole Jr. assistant manager of sales of the Bolt and Nut Div. He has been with Republic and predecessor companies since 1928, and prior to this appointment, was assistant district manager of the Washington, D. C., office.

Flexible Steel Lacing Co. has appointed John Marshall to represent the company in Oregon and Washington. He is a factory and field trained representative.

New Books for Coal Men

Why Explosions and Fires

Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States in 1950, 1951 and 1952, by W. J. Fene and H. B. Humphrey. Here are the facts on explosions and fires in mines over the past 3 yr, with causes assigned. *8 x 10½-in; paper; mimeo. USBM, I. C. 7661. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Easing the Tax Burden

Tax Shelter in Business, by W. J. Casey and J. K. Lasser. Today's taxes play a big role in shaping business policy. This volume states principles and cites case histories showing how a business can hold its own and even grow under present tax structures. *156 pp. 9 x 11½-in; looseleaf; leather. $12.50, Business Reports, Inc., 1 Main St., Roslyn, Long Island, N. Y.*

Stretching Gas Supplies

Gasification of Hydrocarbons, by J. J. Morgan. In this volume, an authority on city gas urges gas-utility companies

NEED TE*?
—YOU GET PLENTY WITH
KERSEY
BATTERY—POWERED
HAULAGE EQUIPMENT

- Model 444 4-Wheel-Drive 4-Wheel-Steer Tractor.
- Model LCM Locomotive—Heights 20" Up, All Gauges.
- Model Tug Tricycle Tractor.
- Coal and Supply Trailers.
- Battery Charging Equipment.
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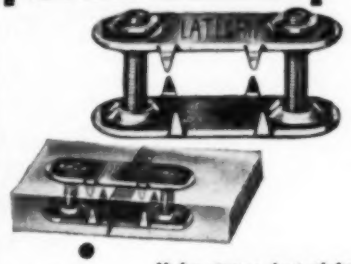
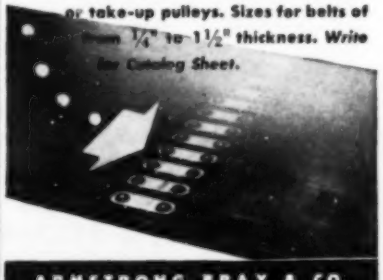
Phone 4228
Bluefield, Virginia
(*TE-TRACTIVE EFFORT)

PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS



- Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from ¼" to 1½" thickness. Write for Catalog Sheet.



ARMSTRONG BRAY & CO.
5348 Northwest Highway, CHICAGO 30, U. S. A.

Parmanco

HI-SPEED HORIZONTAL DRILL

• Drills a 6-inch Hole in two-thirds the ordinary time •

Included in the new design is an auger rack which saves on drilling time. The augers are on the machine as it is moved from hole to hole. Another feature, for faster set up and smoother drilling, is the four individually adjustable level jacks. Automotive steering is optional.

COMPLETELY RE-DESIGNED Around a 40 H. P. ENGINE

• This HI-SPEED DRILL is designed for drilling 5 - 6 - 8 inch holes to 100 feet or more. The 40 H. P. engine with four drilling speeds makes possible the reduction of footage time by one third. This new drill, the very latest in design, is equipped with self-starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes and traction drive with both forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling.

•

Send for Complete Details.

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PARIS

MANUFACTURING CO.

PARIS, ILLINOIS

WHY IT PAYS TO SALT YOUR COAL!

YOU SELL MORE COAL

You Serve Your Customers Better —and it Costs You Nothing!

You and your customers *both* gain when coal is treated with STERLING *Auger-Action* ROCK SALT. Saves time and money, at both ends. Your dealers and industrial customers gladly pay the few pennies it takes to treat a ton of coal. They know rock salt costs far less than labor, or demurrage charges.

You gain, too—with faster turnaround of cars. No freeze-ups. Rock salt keeps 'em rolling—with *payloads*. You ship more coal with fewer cars. And here's how easy it is to use STERLING *Auger-Action* ROCK SALT.

FOR ANTHRACITE—Only 5 to 8 lbs. of STERLING *Auger-Action* ROCK SALT per ton of coal.

FOR BITUMINOUS—Generally needs but 5 lbs. of STERLING *Auger-Action* ROCK SALT per ton.

DE-ICING HOPPERS—Simply spread about 75 lbs. of STERLING *Auger-Action* ROCK SALT over car floor and hopper doors. This quickly frees car of snow or ice.

Savings & Safety . . . AT THE MINE

Prevent accidents and costly delays. STERLING *Auger-Action* ROCK SALT keeps roads, tracks, scales and platforms clear of ice and snow.

SALT YOUR COAL WITH STERLING AUGER-ACTION ROCK SALT

ORDER STERLING *Auger-Action* ROCK SALT in carloads, bulk or handy 100-lb. bags. NOW!

SELL MORE COAL! MAIL THIS COUPON TODAY!

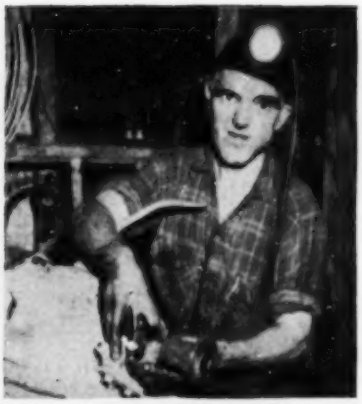
INTERNATIONAL SALT COMPANY, INC.
DEPT. C-10, SCRANTON 2, PA.
Please have your representative contact me.

Name_____

Company_____

Street_____

City_____ Zone____ State_____



COAL MEN ON THE JOB . . .

COALBURG-KANAWHA MINING CO., Coalburg, W. Va.—J. E. Moore (left), mine superintendent; F. M. Johnson, mine foreman; J. A. Willis Jr., vice president, general superintendent and mining engineer; and J. S. Proctor, chief electrician.

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to supplement their natural-gas supplies with synthetic gas to even off peaks and seasonal fluctuations and to fill in when pipelines break. There's a review of known processes for making gas from hydrocarbons, together with case histories of utility companies that have used supplementary gas. *$4.75, Moore Publ. Co., 48 W. 38th St., New York 18.*

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can be turned into

SHORT CONVEYORS

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NOW—3 MODELS

of the efficient time-proved

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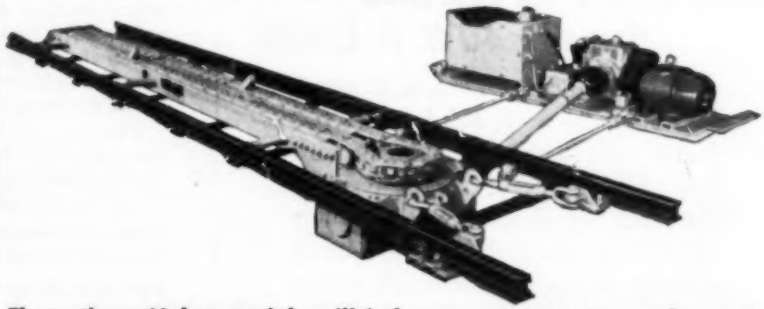
1 DIRECT MECHANICAL DRIVE
Shown in Illustration Below

2 HYDRAULIC FLUID MOTOR DRIVE
Hose Coupled to Remote Power Unit

3 HYDRAULIC CYLINDER TYPE
Hose Coupled to Remote Power Unit



These three Nolan models will help you meet every requirement and condition in spotting cars for loading . . .

and may save you as high as 40 minutes per shift!

The Nolan Porta-Feeder has been in successful use in many mines for over two years. This modern method of moving cars has been accepted as the most efficient in the industry. Its ease of installation and quick movability recommends its use in any mine.

The Porta-Feeder mounts between the rails on top of the track ties, and is secured by jacks. Little or no excavation or preliminary foundation work is necessary. The construction is strong and massive. There are no ropes or cables. Reciprocating pushing dogs deliver constant forward feeding motion. We will be glad to show you a mine in your vicinity where the Nolan Porta-Feeder is operating. Write us now.

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Other Books and Booklets

Minable Coal Reserves of Illinois, by G. H. Cady and others. Bulletin 78. 138 pp, 8 supplementary maps. 7 x 9¾-in; paper. No price quoted. Illinois Geological Survey, Urbana, Ill.

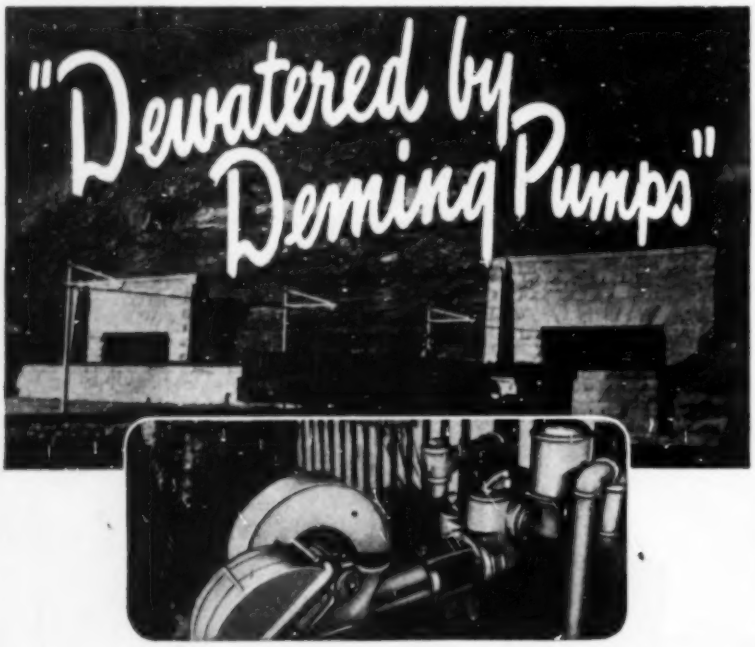
A Thick Coal Bed Near Lake De Smet, Johnson County, Wyoming: Part I, by W. J. Mapel, "Geology of the Area"; Part II, by J. M. Schopf and J. R. Gill, "Descriptive and Analytical Characteristics of Coal in De Smet Drill Cores." Circular 228. Free, Chief of Distribution, U. S. Geological Survey, Washington 25, D. C.

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8 x 10¾-in; paper; mimeo.

Fire-Fighting Equipment in Coal Mines—Selection, Placement and Care, by W. D. Walker Jr., William Eathorne, S. P. Polack and C. M. Keenan. I. C. 7662.

Organizations With Programs Beneficial to Coal-Mine Employees, by W. D. Walker Jr. and S. P. Polack. I. C. 7665. 20 pp.

Estimate of Known Recoverable Reserves of Coking Coal in Somerset County, Pa., by J. J. Wallace, J. J. Dowd, J. A. Bowsher, R. F. Abernethy and D. A. Reynolds. R. I. 4998. 20 pp.



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DEPENDABLE MINE PUMPS

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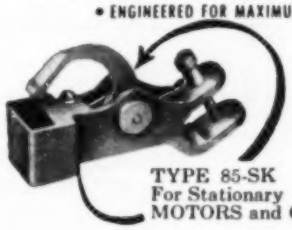

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For Stationary
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. . . and clipped pertinent ideas, articles and advertisements for reference, *please do not burn or throw it away.*
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1) Wastepaper can help to swell the funds of your local Boy Scout Troop, your church or other community organization. It gets a good price these days.

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You need FORMULA 5!*

Here at last is a freeze-proofing compound that costs less and does more! Morton's new "Formula 5" was designed to meet the winter needs of the coal industry.

Here are just a few of the advantages of "Formula 5":

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*"Formula 5" is a free-pouring, dry application composed of sodium chloride (30-70 mesh), a special anti-corrosive compound, and scientifically screened to produce an ideal dissolving rate.

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. . . and how it performs!

We've been asking you to "See it perform" when the Gundlach 2-stage Double Adjustable Coal Crusher, visited your coal fields.

Now we have positive proof of its excellent performance in the field. Mr. T. J. Gundlach has just completed a trip through the East Kentucky coal fields, demonstrating his crusher at many mines. The results obtained with the crusher, were enthusiastically praised by the operators of every mine that was visited.

Many letters were received, each praising the performance of the crusher. For example, here is a chart taken from one of the letters, showing the results of a test run of coal, again proving Gundlach's superiority in minimizing the percentage of carbon and oversized coal.

	3" x 1¼"	4" x 1¼"	4" x 3"	4" x 3"
1" plus	6.64	6.14	8.25	4.46
1" x ⅜"	20.82	23.39	22.92	20.27
¾" x ½"	35.84	33.37	31.17	31.02
½" x ¼"	23.02	20.55	18.34	22.04
¼" x ⅛"	7.24	8.81	9.01	10.50
⅛" x 0"	6.44	7.74	10.31	11.71
Totals	100.00%	100.00%	100.00%	100.00%

• If you would like to have the Gundlach 2-Stage Coal Crusher demonstrated at your mine, write:

T. J. GUNDLACH MACHINE COMPANY | BELLEVILLE, ILLINOIS

Improve your batting average...
Personalized Service
for your mining operation
C. O. C. C. Personalized Service in Workmen's Compensation and Public Liabilities can add efficiency to your mining operation while lowering operational costs. Our established engineering facilities are available to help increase production, lower accident frequencies, save operational time and equipment. In addition, prompt claims handling and effective rehabilitation of injured personnel promote harmony and production efficiency.
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2 NEFF & FRY COAL "STANDPIPES"

Nearly a day's output of coal can be accumulated in the two Neff & Fry Silos at the Lyburn mine of Lyburn Mines, Inc. There the silos serve as reservoirs in which to store coal in the event of mining, processing, or shipping interruptions.

The larger silo is 26 ft. dia. x 45 ft. high. The smaller one is 20 x 32½ ft. Coal from the mine is fed into either silo. Thence it is conveyed by belt to the tipple.

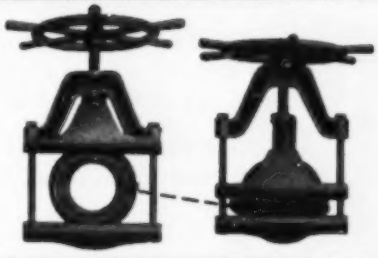
This is one of the many installations we have made at coal mines. Most of the silos are used as "standpipes" to stabilize the flow of coal. We collaborate with the manufacturers of conveying machinery to design the system which best meets the local requirements.

After you have read our literature and exchanged correspondence with us regarding your specific problems, one of our engineers will be glad to discuss details with you if you desire. We are sure that it will be well worth your while to communicate with us.

THE NEFF & FRY CO. • 228 Elm St. • Camden, Ohio

SUPER-CONCRETE STAVE STORAGE BINS

MASSCO-GRIGSBY RUBBER PINCH VALVES



for abrasive and corrosive pulps and liquids

IT'S HINGED ... for longer wear.

MOLDED RUBBER resists abrasion and corrosion ... gives long life without maintenance.

UNOBSTRUCTED FLOW PASSAGE ... eliminates high friction loss.

Sizes 1" to 12"

WRITE FOR BULLETIN

The Mine & Smelter Supply Co.
DENVER 17, COLORADO
Salt Lake City, El Paso, 1745 Broadway, N. Y. C.
REPRESENTATIVES IN FOREIGN COUNTRIES

DIVIDENDS... in human lives

BUSINESS EXECUTIVES!
CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ◯ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ◯ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ◯ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ◯ HAVE YOU ARRANGED TO HAVE A BLOOD-MOBILE MAKE REGULAR VISITS?
- ◯ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ◯ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ◯ WAS THIS INFORMATION GIVEN THROUGH PLAN BULLETIN OR HOUSE MAGAZINE?
- ◯ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ◯ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . . the need for blood is **urgent!**

NATIONAL BLOOD PROGRAM

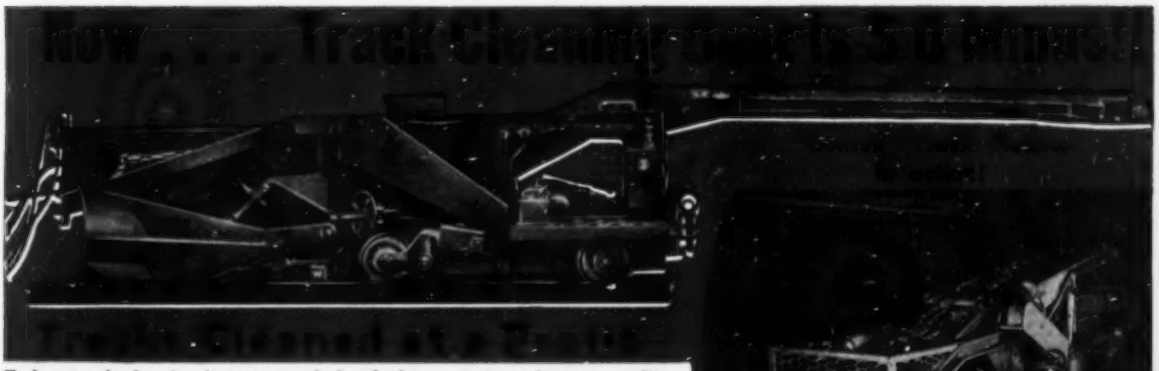
America's blood bank needs **more** blood, **now**. Be a regular depositor and know that your dividend is saving a life of some American—somewhere.

It may be a soldier shot down in battle, suffering from **shock**. Or someone here at home, sick and in dire need of new blood to restore life. A mother in childbirth, or a child in an accident.

America must give. America is **you**. Won't you call your Red Cross, Armed Forces or Community Blood Donor Center right now, for an appointment?

GIVE BLOOD

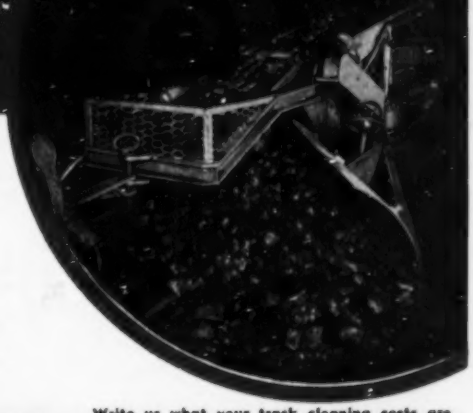
...give it again and again



Today, track cleaning is not a costly headache . . . it is a pleasant, profitable operation. No track workers to get hurt. Clean tracks once thoroughly with the Canton Track Cleaner. Then subsequent cleanings yield good coal. Load cars higher, haul more tonnage. Reclaim spillage mechanically. Write us for name of nearest mine where you can make inspection.

Performance Records . . .

893 three-ton cars, on time and one-half, were loaded with machine at a cost of $.462 per ton. Hand loading (estimating five 3-ton cars per man per shift) would cost $1.31 per ton. Total cost at $19.575 per shift for 893 cars with machines — $1237.70. Same number of cars, hand loading, would cost — $3509.49. Would the saving of $2271.79 have any effect on your cost per ton of coal? Another company loaded 887 tons at a cost of $.465 per ton cleaning 27860 ft. of track at $.015 per foot. (Names on request.)



Write us what your track cleaning costs are and how many miles of track you clean, and we will show you how much extra profit you can make with a "Canton" Track Cleaner, after it has paid for itself.

American Mine Door Company

4037 Dueber Ave. • • Canton 5, Ohio

Cable Splicers and Vulcanizers

SLIPKNOT . . . SYMBOL of SAFETY in the Mining Industry

SLIPKNOT FRICTION TAPE LEADS ALL OTHERS IN PREFERENCE

Consistent high quality . . . far in excess of all specifications . . . has made Slipknot the most widely used friction tape in the mining field.

This outstanding Friction Tape is guaranteed not to dry out. It will not ravel at the edges and retains its exceptional adhesive qualities under all conditions.

PLYMOUTH PLASTIC ELECTRICAL TAPE

Another Top Performer, Plymouth Plastic Electrical Tape is thinner — for neater, more compact jobs. Has high dielectric strength, resists water, oil and corrosion.

BACKED BY MORE THAN 50 YEARS OF MANUFACTURING INTEGRITY

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Established in 1896

CANTON, MASS.

54 YEARS

CUSTOM-ENGINEERED MINE CARS . . .

ENTERPRISE

WHEEL AND CAR CORPORATION
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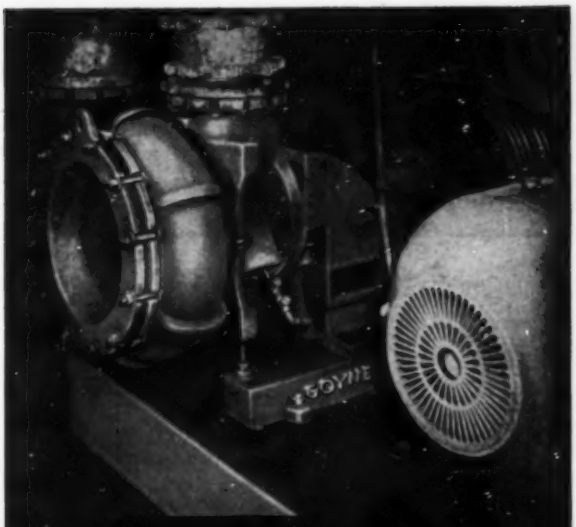
HUNTINGTON, WEST VIRGINIA



GOYNE
SOLIDS HANDLING PUMP

Feature:
LOW-COST OPERATION

GOYNE SOLIDS HANDLING PUMPS are extremely popular with a very large number of coal companies who find them quite reliable for pumping:

Liquids with solids added to increase specific gravities for coal and refuse separation in coal preparation plants.

Disposing of refuse and silt by pumping to waste material banks or for back filling into mined out areas.

Pumping prepared coal to temporarily desired storage areas.

These specially designed Goyne pumps incorporate numerous features to reduce upkeep and labor maintenance costs to a minimum:

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing *only the rear head of the pump.* No suction or discharge piping or any other major part of the pump is disturbed.

2. The only packing box of the pump is subjected to the low suction pressure rather than to the discharge pressure developed by the pump. This feature assures long packing and shaft sleeve life.

3. Impeller clearance is adjusted while the pump is running, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. Spare parts are carried in stock at our plant for prompt shipment. Reduce your inventory by using Goyne Process Pumps.

All inquiries are given a thorough engineering analysis and our prompt attention.

GOYNE MINE PUMPS 1881

The GOYNE STEAM PUMP CO.
ASHLAND, PA.

cut brattice costs *with*
AIRTITE
DEMOUNTABLE STOPPINGS

Replace both wood brattices and concrete block brattices. Flexible enough to withstand blasting shocks close to face and enduring enough to last for years. Consist of vertical 24-gauge galvanized pans 12" wide with 3" flanges. Two pans telescope together to provide any height. Pans are clamped to two 2" x 2" steel angles mounted horizontally in holes drilled into rib about 1' and 5' from top. Have been approved by State and Federal mine inspectors after installation.

- **1 STOPPING REPLACES 2 BRATTICES**
- **LIGHTWEIGHT · EASY TO HAUL**
- **EASILY INSTALLED · 2 MEN · 2 HOURS**
- **EASILY RECOVERED AND REUSED**
- **PAY FOR THEMSELVES**

PAT. PEND.

WRITE TODAY FOR COMPLETE INFORMATION AND PRICES

TRI COUNTY BUILDING SERVICE

ALSO Manufacturers of Demountable Overcasts

P. O. BOX 405 · TAYLORVILLE, ILL.

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Advertising men agree – to do a complete advertising job you need the double effect of both Display Advertising and Direct Mail.

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Some people have a wrong conception of Direct Mail. There's no hocus-pocus to it—there's no secret formula—nor is there need for an extensive department to plan and execute your mailing program. You don't even need your own mailing lists.

Probably no other organization is as well equipped as McGraw-Hill to solve the complicated problem of list maintenance in industrial personnel. Our lists are compiled from exclusive sources, based on hundreds of thousands of mail questionnaires and the reports of a nationwide field staff, and are maintained on a twenty-four hour basis.

In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want.

Ask for more detailed information today. You'll be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

McGRAW-HILL
PUBLISHING COMPANY, INC.
330 WEST 42nd STREET, NEW YORK 18, N. Y.

SAFE, SPEEDY TRANSPORTATION

ACME UTILITY CAR

* SAFE, SPEEDY TRANSPORTATION — for mine mine supervisory personnel. Can also be used as a utility car for hauling supplies. Accommodates visiting personnel and survey crews with equal ease and comfort.

* LIGHT WEIGHT YET RUGGED — all welded steel construction. Pressed steel wheels lower total weight.

* COMFORTABLE — 4 wheel spring suspension assures a comfortable ride plus ability to "stay on the rails".

* AVAILABLE — with or without trolley pole or head lights.

* 4 WHEEL DRIVE — gives good traction on all grades.

SPECIFICATIONS

Overall Height above Track ..... 38"

Overall Width ..... 32"

Overall Length ..... 108"

* MORE INFORMATION — is available about the ACME SPT UTILITY CAR — so contact your ACME representative or,

ACME MACHINERY CO.

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. . . and nothing specializes on your business like your business paper

Here's a smart bird who knows how to sell fast. He *specializes* . . . picks cold customers who are hot prospects!

Specializing is profitable in your business, too. That's why this business paper of yours is so important. It means no frustrating scrounging for facts you need. A whole staff of editors scouts the country for you . . . and lines up new ideas, the facts about new products and materials, the profit slants on your business—in article after article—like a row of sittin' ducks.

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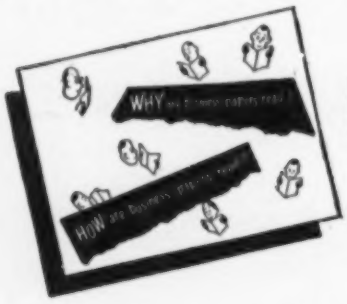

A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet." Room 2710.

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd St., New York 36, N. Y.

One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

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(Classified Advertising)

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An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

SEND NEW ADVERTISEMENTS to New York Office, 330 W. 42nd St., N. Y. 36 for November Issue closing October 20th.

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Internationally prominent manufacturer of heavy machinery used in mining, crushing, cement and basic processing industries, located Midwest, has excellent opportunities for Mechanical Design Engineers and Draftsmen for research and development and new product design. Liberal employee benefits, plus exceptionally fine working conditions and opportunity for future. Write, stating experience, present employment, personal data and salary expected. Replies confidential.

P 8778 COAL AGE
520 N. Michigan Ave., Chicago 11, Ill.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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MINING ENGINEER and Operating Assistant in Central Penna. Write to P-9283, Coal Age.

POSITIONS WANTED

ENGINEER, BSME, desires position as maintenance engineer and supervisor. 27 years old, married. 4 years experience in maintenance in open-pit mines. PW-9275, Coal Age.

GRADUATE MINING engineer with 30 years experience in U.S. Coal mines, familiar with all phases of mechanized mining, has recently completed three years in mines in foreign countries and is available for relocating in the U.S. or for foreign assignment. Address PW-9086, Coal Age.

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Strip Coal Wanted
Lease or purchase—large or small tracts. Morgan Coal Company, 2850 North Meridian Street, Indianapolis 8, Indiana.

WANTED

Used Wet Washer Type Cleaning Plant.
Capable of handling three to four hundred tons per hour.

W 9177 Coal Age
330 W. 42 St., New York 36, N. Y.

FOR SALE

MODEL 75 LORAIN CRANE
Equipped for Clamshell Operation
Excellent Condition—Recently completely rebuilt
Price $7000.00 FOB Red Bank, N.J.
THE TULLER CONSTRUCTION COMPANY
95 Monmouth St. Red Bank, N.J.

$2.95 EACH OR 2 FOR $5.00!

Upright Telephone complete with cord in Tested and Guaranteed condition. For Inter-communication or extension. Complete list of telephone parts, inter-communication sets, switchboards, handsets magneto and dial telephones, etc. Write for list. F.O.B. Simpson, Pa. C.O.D. Shipments accepted.
TELEPHONE ENGINEERING CO.
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FOR SALE
At
EUNICE MINE, EUNICE, W. VA.

42" Gauge

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12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

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1—4 ton Mancha, battery, 24" ga., with Edison batteries and charging set
1—4 ton Ironton, battery, 36" ga.
2—7 ton G. E. permissible battery, 36" ga.
1—7 ton Atlas, battery, 36" ga.
3—8 ton Ironton, 36" ga.
2—8 ton General Electric, battery 36" ga.
4—10 ton Atlas, battery, 36" ga.
1—3 ton Whitcomb gas engine driven, 24" ga.
1—2½ ton Jeffrey trolley, 36" ga.
1—4½ ton Goodman trolley, 36" ga.
1—5 ton Jeffrey trolley, 36" ga.
1—6 ton Goodman trolley, 36" ga.
2—8 ton Goodman trolley, 36" ga.

COAL CRUSHERS

1—24" x 24" Jeffrey Single Roll
1—24" x 36" McNally-Pittsburg Double Roll
1—30" x 45" Jeffrey Single Roll
1—30" x 16" Williams Pulverizer
1—36" x 42" Double Roll Crusher
1—36" x 48" Jeffrey Hammermill

TUGGER & SLUSHER HOISTS

1—5 HP Brownie Room Hoist
2—5 HP Sullivan RH single drum Room Hoists
1—7½ HP Sullivan double drum Slusher Hoist
2—10 HP Sullivan 3 drum Slusher Hoist
1—25 HP Sullivan 2 drum Slusher Hoist
1—Ingersoll-Rand Mod. 6HC Air Tugger Hoist
1—Ingersoll-Rand Model EU Air Tugger Hoist
2—6½ HP Sullivan Single Drum Air Tugger Hoist, 250 Volt DC
7—6½ HP Sullivan Double Drum Slusher Hoist, 250 Volt DC
1—10 HP Double Drum Sullivan Slusher Hoist Driven by Continental Gasoline Engine

BOX CAR LOADERS

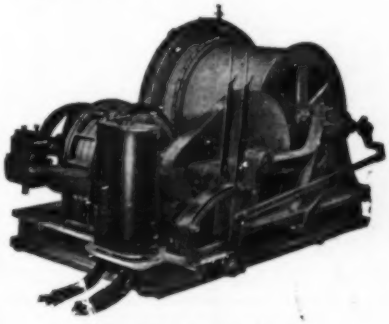
2—Ottumwa 20 HP Box car loaders
3—Maniere 22 HP Box car loaders
1—Jeffrey 20 HP Box car loader

MINING MACHINES

2—7B Sullivan super short wall coal cutters
18—CE7 Sullivan coal cutters
1—CR3 Sullivan coal cutter
1—Jeffrey 28A coal cutter
6—Goodman 112-A coal cutters
1—Sullivan CH-11 ironclad shearing machine
1—Jeffrey 29-C Arcwall coal cutter

LOADERS & CONVEYORS

1—8BU Joy loader
2—61EW Jeffrey elevating chain conveyors
1—61HG Jeffrey chain conveyor, 90'
1—61W Jeffrey chain conveyor, 200'
9—G-20 Goodman shaker conveyors
10—G-15 Goodman shaker conveyors
8—Vulcan shaker conveyors
2—Joy ladel UN-17 shaker conveyors
10—Goodman HA duckbills



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1—11 HP Vulcan #0 single drum
1—20 HP Vulcan single drum
1—22 HP Vulcan double drum
1—25 HP Vulcan single drum
1—30 HP Vulcan single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
4—100 HP Box single drum
1—112 HP Vulcan single drum
1—145 HP Vulcan single drum
2—150 HP Vulcan single drum
1—375 HP Box Single Drum Hoist, 800 FPM with 375 HP GE Slipring Motor, 575 RPM, complete with controller, grids and magnetic contact panel.
1—600 HP Box Single Drum Hoist, 25,000# Rope Pull, 900 FPM, Hydraulic Post Breaks with 600 HP Westinghouse Slipring Motor, 435 RPM, controls and magnetic contact panel.

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2—8-H Jeffrey 42" Aerodyne Fans
1—Jeffrey 8 x 4 Fan
5—Jeffrey A61 exhaust blowers
8—Jeffrey Aerodyne midget blowers

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3—100 ton Fairbanks railroad scales
1—100 ton Howe railroad scale
1—125 ton Howe railroad scale
1—5000# Fairbanks Tipple scale with weighing basket
1—5000# Howe Tipple scale

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2—50 ton capacity steel bins

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1—4 deck shaker screen 32' long in 2 sections, driven by 10 HP & 25 HP motors
1—4 deck card shaker screen, 18' long, driven by 50 HP motor
1—Card rotary car dumper
1—Bucket Elevator, 36'6" centers, 18" x 8" buckets.
1—Bucket Elevator, 45' centers, 6"x4" buckets
1—Jeffrey picking table, 19' centers, 36" wide
1—Jeffrey picking table, 19'8", 36" wide
1—Jeffrey Scraper Conveyor, 88'6", 36" flights
1—Jeffrey Scraper Conveyor, 72', 30" flights
1—Jeffrey Scraper Conveyor, 67', 30" flights
1—Jeffrey Scraper Conveyor, 69'6", 28" flights
1—Link Belt Scraper Conveyor, 50', 12" flights
1—32" x 9'6" Card vibrating screen
1—4' x 6'6" Link Belt jig washer
1—Loading boom, 32'3" centers, 24" flights with 8' grizzly
1—Loading boom, 55' centers, 48" flights
1—Loading boom, 45' centers, 30" flights
2—Card self dumping mine cages
2—Card 84" bicycle sheave wheels
1—24" Belt conveyor, 13' centers
1—24" Belt conveyor, 135' centers
1—24" Belt conveyor, 66' centers
1—30" Belt conveyor, 173' centers
1—Red Devil egg loader, 16" flights
1—Ottumwa nut loader, 16" belt

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440 ft—New 18", 4 x 6 Step Ply Conveyor Belting

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1—Goodman Mfg. Co. Conway Loader, Type 115, Serial #346, 36" Gauge, with Westgh. DC Motors.

5—Goodman Mfg. Co. E Shaker Conveyor, with Westgh. SK 63, 7½ HP, 1150 RPM, DC Motors, and Drive Troughs.

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2—300 KW West. 275 v. 1200R-Syn. 2300 v.
300 KW G.E. 275 v. 1200R-MPC-ATI 2300/4000 v.
298 KW West. 275 v. 1200R-SK-CW 2300 v.
250 KW G.E. 275 v. 1200-MPC-ATI 2300/4000 v.
200 KW Ridg. 275 v. 900R-Syn. 2300 v.
200 KW West. 275 v. 1200 R SK-Syn. 2300-4000 v.
200 KW G.E. 125 v. 1200 R MPC-ATI 2300/4000 v.
150 KW G.E. 275 v. 1200 R MPC-ATI 2300/4000 v.
150 KW G.E. 550 v. 900 vR-DLC-ATI 2300/4000 v.
100 KW Ridg. 275 v. 1200R-Syn. 2300 v.
100 KW G.E. 275 v. 1200 R. RC-ATI 2300 v.
75 KW G.E. 275 v. 1200R. MPC-Sq. Cg. 2300/440 v.
50 KW G.E. 275 v. 1200R. MPC-Sq. Cg. 2300/440 v.
35 KW G.E. 125 v. 1750 R. RC-KT 220/440 v.

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2—500 KW G.E. 275 v. HCC6-1200R. 13,200 v.
300 KW G.E. 275 v. HCC6-1200R. 2300/4000 v.
300 KW G.E. 275 v. HC12-600 R. 2200/4000
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2—500 KW. Rotary Converters; 1—General Electric, Type HCC, Serial #842327, 1200 RPM, 6 ring, 275 volts DC, 1800 amps, complete with transformer and switch gear, 2300/4160 volts, 3 phase, 60 cycle. 1—Allis-Chalmers, 1200 RPM, 6 ring, Serial #113258, 275 volts DC, 1800 amps, complete with transformer and switch gear, 2300/4160 volts, 3 phase, 60 cycle.

1—200 KW. Rotary converter, Westinghouse, 1200 RPM, Serial #1555041, 6 ring, 30 cycle, 275 volts DC, 600 amps. Complete with transformer and switch gear, 2300/4160 v., 3 ph., 60 cy.

NEW direct current motors in stock—¼ HP. through 75 HP.

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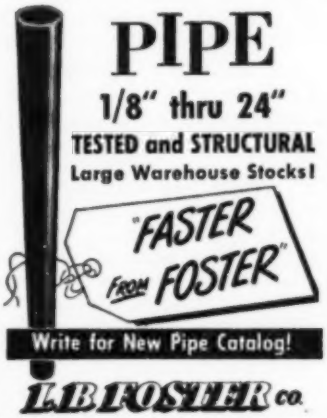

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75 KW—230 volts DC—totally enclosed, self-contained. Waukesha 6 cyl., 160 HP, 1200 RPM diesel driving 75 KW 1200 RPM G.M. marine type generator. Self-contained switchboard and radiator.

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GM 8 cyl. 6½x7 diesel model 8-268A—120/240 volts DC — 1250 amps. — 1200 rpm — with switchgear.

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510 HP at 360 RPM—5 cylinder—14½x18—type ZDSB—non-reversing—vertical—4 cycle—cold starting—mechanical injection. Engine totally enclosed. Complete with 48" 7 groove V-belt sheave and new spare parts. For heavy duty pumping, dredge service, power generation, textile and saw mills, mining, etc. Excellent condition. For immediate delivery.

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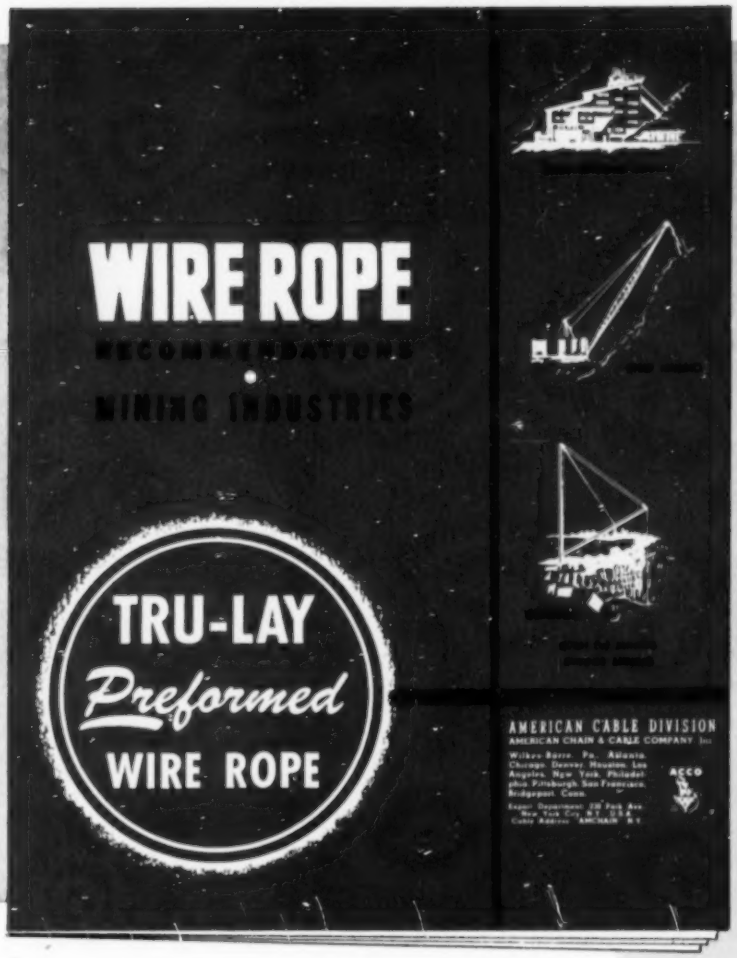

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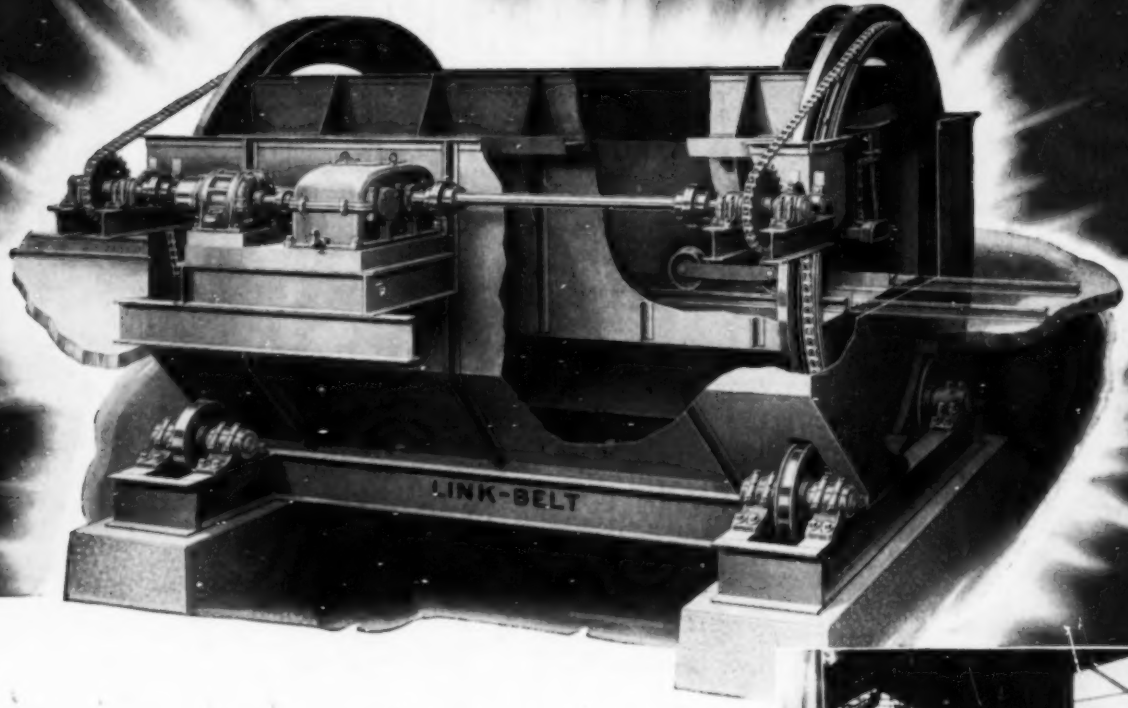

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